Businessmen Can't Dodge Politics

Most agree that action is imperative; big question is how far to go . . . . . page 27

Isosorbide Arouses New Interest

Three-dimensional interpretation points up 'convertible reactivity' potential . . . . . page 69

CHEMICAL PROCESSING®

CHEMICAL BUSINESS

SEPTEMBER 1960

Are you ready to meet . . .

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Here's what you must know about your computer specialists . . . plus tips to take the grief from hooking up and closing the loop . . . page 35

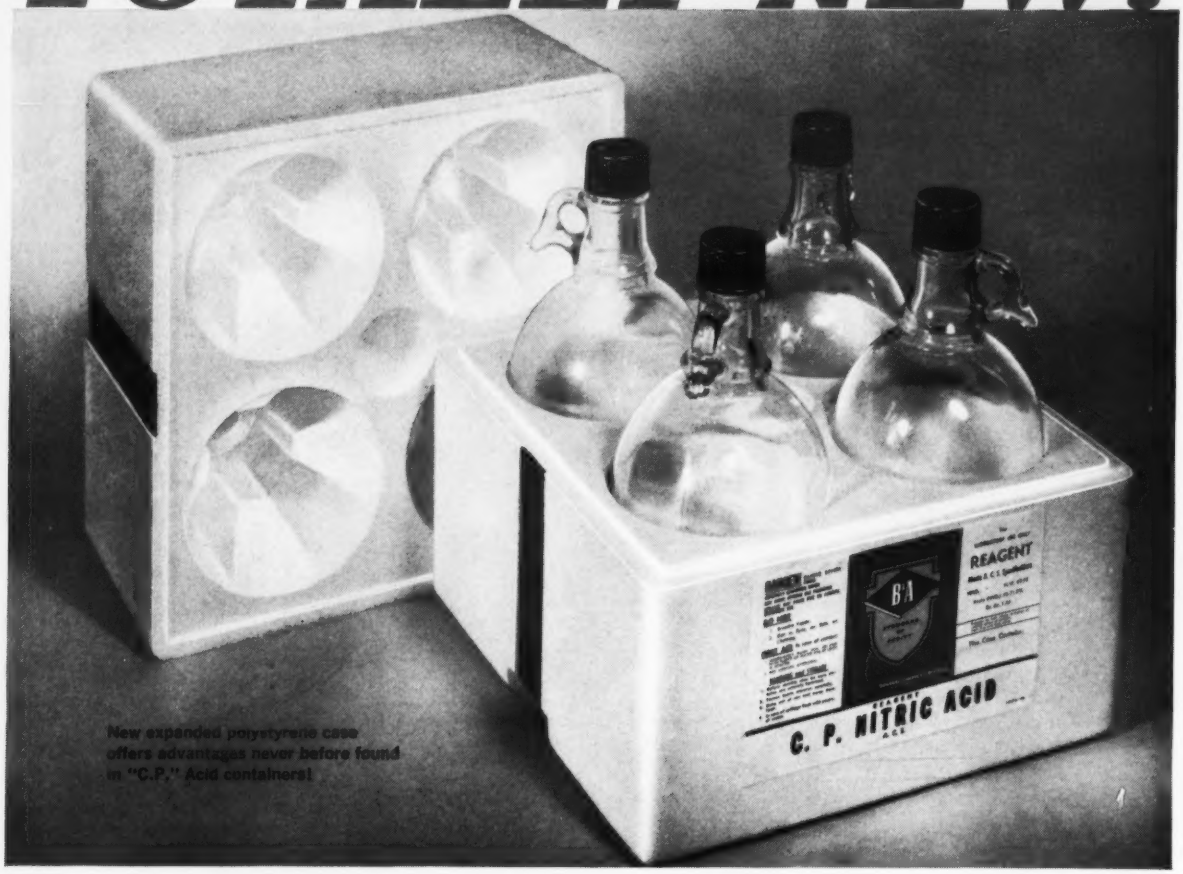


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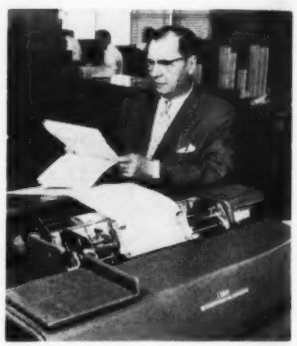
Check 4221 opposite last page.

that's interesting

Computer takes over editorial chair

A versatile IBM computer, trained to index thousands of articles appearing in leading chemical journals of the world, has taken over the editorial chair of a 104-page semi-monthly publication named Chemical Titles.

Published by Chemical Abstracts Service, division of American Chemical Society, publication features unique format giving the user immediate clues as to which articles listed may touch upon his field of interest.



Editor at work — not the man — the machine!

"Clues" are actually portions of full titles which computer has selected, each portion containing significant "key" word as its nucleus. As journals are received at Columbus, Ohio, Headquarters of CAS, card-punch operators transcribe author, title and publication source of each article into machine-readable form. From this point on all operations are performed automatically.

Tan in tablet

Suntans are being attained by a variety of routes these days, but one of the most unusual is provided by a tablet that helps to protect against sunburn, speeds tanni g process, and, in most cases, provides longer-lasting tan.

Known as Meloxine, tablet was developed from the fruit of a Nile river weed.

THAT'S INTERESTING

Now it's bus-back!

Add a 1½-ton trailer to an inter-city bus and you have "bus-back", the newest member to the growing transportation family of piggyback, fishyback and birdyback. Railway Express agency created new service by hitching trailers to Transcontinental Bus System buses on 136-mile run between Joplin, Mo., and Harrison, Ark.

Nuclear notion

Concerned over fact demand for roadbuilding materials is zooming but supply of aggregates is diminishing, technical team suggests that perhaps nuclear energy may be used to transform clays and other undesirable materials into useful aggregates. Idea was posed in National Academy of Sciences-National Research Council report.

For more information on product at right, specify 4222 see information request blank opposite last page.

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CHEMICAL PROCESSING
CHEMICAL BUSINESS

HIGHLIGHTS

SEPTEMBER 1960
VOLUME 23 • NUMBER 9

Special This Month

27 Businessmen can't dodge being in politics
Question is how, when and where, not whether to take plunge, leaders aver

31 Polyisoprene, polybutadiene pace quickens
New entries push plans as boom promises to hike capacity to 200,000 long tons/yr by late 1961

33 Meeting the computer-control challenge
What you must know about your computer specialists, plus tip-full "trilogy" on hooking up, closing loop —part of 32-page feature on Instrumentation and Control methods, equipment, literature

49 Upflow digester boosts pulp uniformity
Unique reactor continuously delivers 125 tpd; boasts excellent thermal stability

69 Isosorbide—material of 'convertible reactivity'
New three-dimensional look at intermediate arouses interest of chemists

127 Microbiological corrosion controlled
Amine-type treatment slashes rate in refinery cooling system from 35 to one mil/yr

THIS MONTH'S COVER

Harbinger of things to come in the chemical processing industries is the lighted room with attendant in lonely vigil over a computer controlling operations of the dark-enshrouded plant in the background. This view of B. F. Goodrich Chemical Company's vinyl chloride monomer plant at Calvert City, Ky., helps single out our feature on meeting the computer control challenge. Beginning on page 35 you'll find advice on what you must know about your computer specialists and on subsequent pages a trilogy of tips to take the grief from hooking up and closing the loop.

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over the editor's shoulder



Automatic Plant? Answer — Computerization?

In applying computers many new facets have been revealed which have helped toward the better understanding of process operations.

In appraising the computer let's keep our eye on the over-all picture — the process, instrumentation, computer. This all adds up to knowing the over-all picture.

All of these new concepts including that of process dynamics can't be appraised by cost accounting procedures alone. This is a research phase — a period of learning and one of understanding. In this stage there'll be some disappointments — also some cutbacks — but one can't hold back progress. Further study and evaluation is needed from which will come in time the truly automatic plant.

Instrument and computer manufacturers need to know more about processes — but this information must come from the users. On the other hand, users need more knowledge of the hardware and its limitations. Thus, close cooperation between user and manufacturer is needed so that both can work closely to secure the final result of better over-all operation.

Although the user feels that the manufacturer should do all the process research before application, nevertheless this should be a cooperative effort. Also the user should supply manufacturer with enough data regarding so-called "secret processes" so that the manufacturer may make proper recommendations.

The "truly automatic plant" will only result when perfection in measurement, control and computerization are achieved.

A series of three feature articles (page 35) sets forth helpful ideas on "Evaluating the Computer", "Linking the Instrument System to the Computer" and "Closing the Loop". Here are guides to a better understanding of applying Computer Control.

John C. Vasler



It's Horse Sense . . .
Why Chance Leaks in Seat Rings

Get Monel Seat BRONZE GATES made the way JENKINS makes them

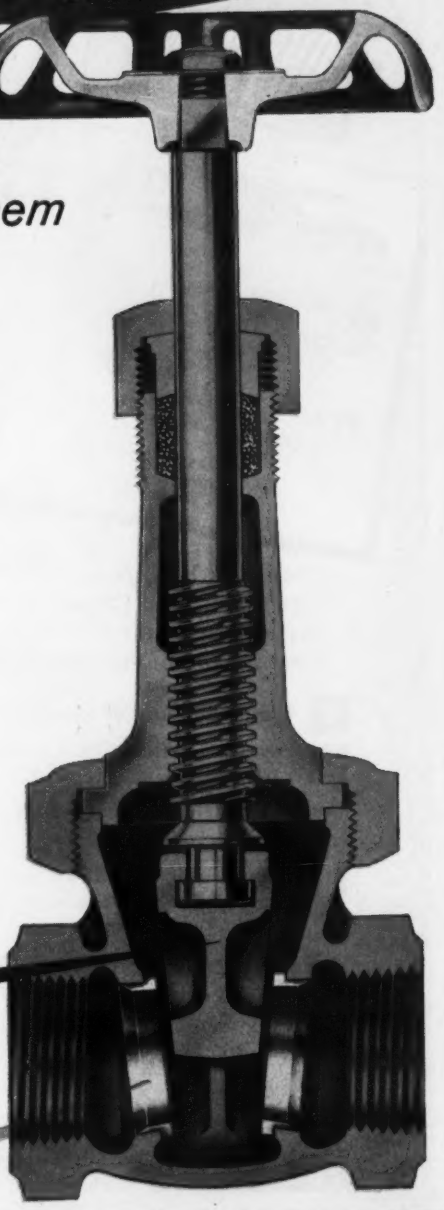
It's plain horse sense that you had better have the Monel seat rings EXPANDED (ROLLED) into the valve body if you want them to stay tight and leak-proof.

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Your local Jenkins Distributor will quickly supply your needs from a wide variety of Jenkins Bronze Gates. For information about these valves, write for folder No. 181-C. Jenkins Bros., 100 Park Ave., New York 17.



WEDGE is less hard than seat rings. Wear affects this easily replaceable part . . . NOT seat rings



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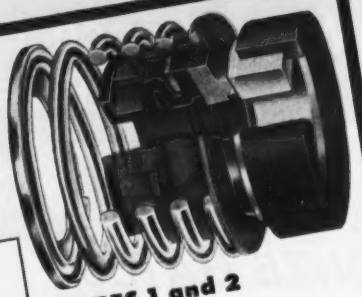
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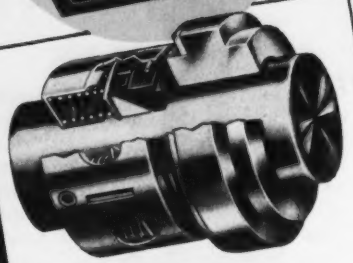
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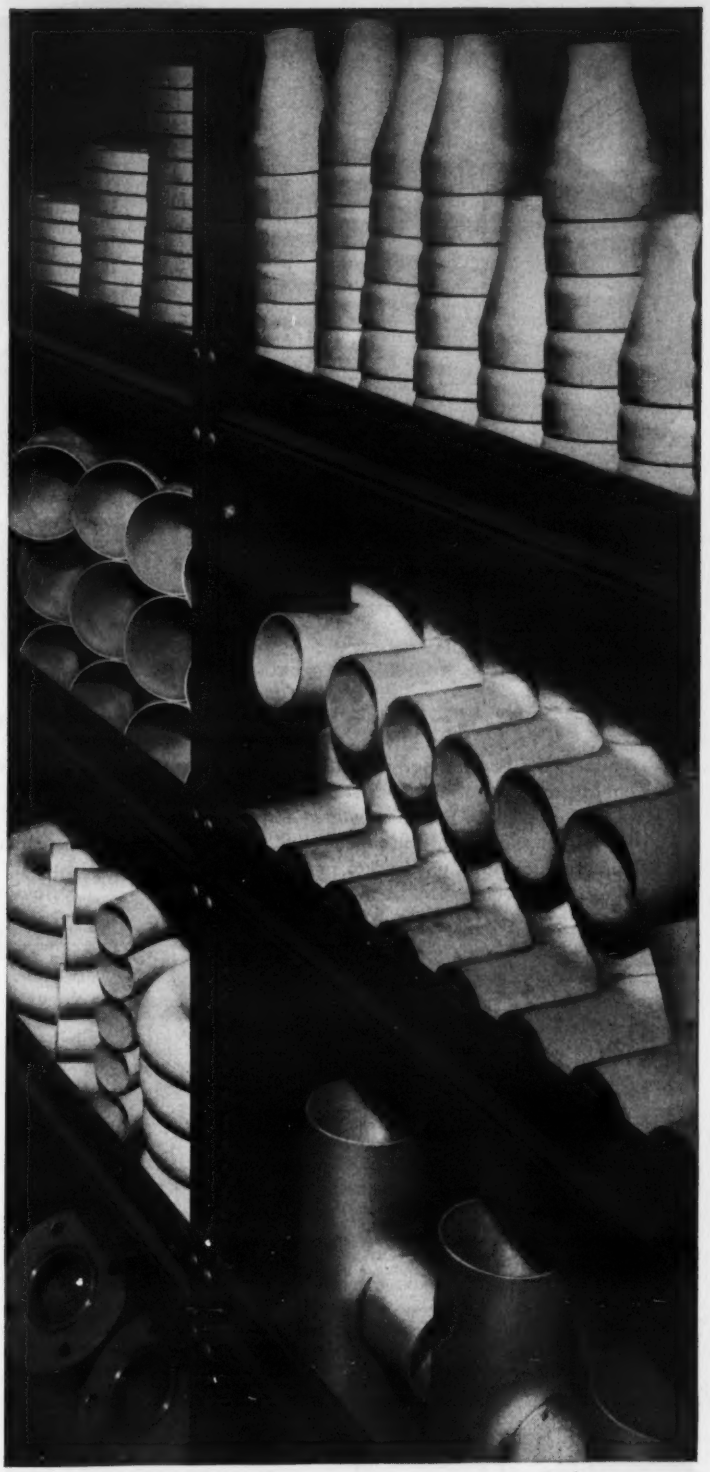
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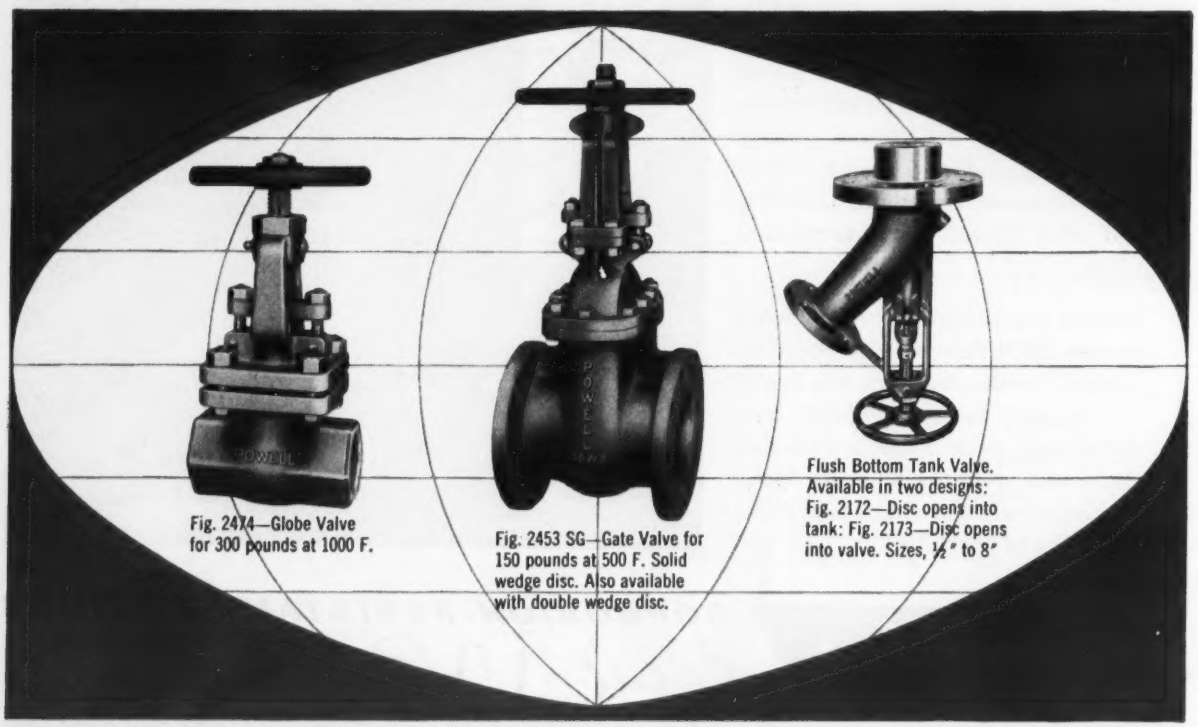


Fig. 2474—Globe Valve for 300 pounds at 1000 F.

Fig. 2453 SG—Gate Valve for 150 pounds at 500 F. Solid wedge disc. Also available with double wedge disc.

Flush Bottom Tank Valve. Available in two designs: Fig. 2172—Disc opens into tank: Fig. 2173—Disc opens into valve. Sizes, ½" to 8"

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CHEM-TRENDS / Our Growing Industry

Two firms rush plants to stake early claims in polybutadiene, polyisoprene

Construction of two plants with projected total combined capacity of up to 75,000 long tons of polybutadiene and polyisoprene rubber per year is being pushed by two chemical companies.

Polybutadiene synthetic rubbers have only recently attracted commercial interest. It has outperformed natural rubber in truck and passenger car tests totaling millions of miles in the past three years. The new material is expected to replace a substantial amount of natural rubber in tire treads. (*See page* 31.)

Phillips Chemical Company, subsidiary of Phillips Petroleum Company, and developer of the "Cis-4" polybutadiene rubber process, is expanding capacity of its plant now under construction from 20,000 tons/yr to 25,000 tons/yr.

Phillips expects to have its plant in full operation late this year.

American Rubber and Chemical Company, one of two Phillips licensees in the U.S., is constructing a multi-million dollar plant at Louisville, Ky., to produce polybutadiene and polyisoprene synthetic rubbers. Initial capacity of this plant will be 30,000 long tons/yr of these synthetic rubbers. However, the plant can be modified to increase output to 50,000 long tons/yr.

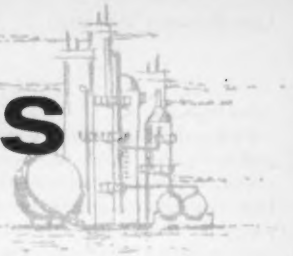
American Rubber and Chemical Company is a joint venture by **Stauffer Chemical Company,** New York, and **American Synthetic Rubber Company,** Louisville, Ky.

The American Rubber plant is scheduled for completion in September 1961.

To page 10

AS CP's EDITORS SEE THEM

CHEM-TRENDS



▸ **Steel "pipelines" haven't refilled** following settlement of strike, according to pattern of previous post-strike periods, say some chemical industry executives who are wondering if operations research studies with computer solutions of complex "inventory" models maybe haven't indicated to industry advantages of "going slow."

▸ **Steel industry rushes construction of 16 new oxygen plants** during mill inactivity. These will supply some 4900 tons/day of oxygen to adjacent steel mills, will up industry consumption to 46.5 billion cu ft/yr — which is expected to rise to 71 by 1965. Steel from vertical "lance" converters uses 1800 cu ft oxygen per ingot ton; open hearth roof jet, 600-800.

▸ **Important technical advisory group to Federal Government** has appointed a Michigan University chemistry professor to represent chemistry and chemical technology. He is Robert C. Elderfield . . . group is National Research Council of National Academy of Sciences.

▸ **Some 30,000 copies of wartime OSRD's hitherto classified technical reports on developments and devices have been made available for public access.** Most projects of Office of Scientific Research & Development are included; excluded are devices relating to unorthodox warfare. Copies of reports may be obtained from Commerce Department's Office of Technical Services in Washington.

▸ **March was a peak month for most plastics,** Commerce Dept. figures show. Likewise was last October. In May polyethylene advanced to a new record high — 120 million lb. For previous two months it levelled at 114.

▸ **Factory inspection by FDA to "verify that the (drug) firm can insure the identity, strength and purity of each batch . . ."** is one of new rules announced by agency, evidently intended to make sweeping changes in present industry procedure. Rule also states that drugs can be withheld from market until assurances are obtained by inspections. In another rule, printed matter accompanying drugs is to carry complete information for safe use. "Interested persons" are allowed until mid-September to offer their views — after this, a final order will be issued, according to notice in Federal Register.

▸ **Job commitments for newly graduating chemical engineers were in May at about same level as previous two years,** according to Engineers Joint Council Manpower Commission. Deans of engineering and placement officers from over 100 colleges and universities were quizzed; sampling covers about 39% of total graduating class. 67% of chemical engineers had job commitments, as compared to 64% and 70% of '58 and '59. All engineering graduates averaged 82% (compared to 83% and 78%). ChE's have "by a wide margin the highest percent entering graduate school" — 15%.

▸ **Past 60 years is termed "lost era"** by Ford Foundation-sponsored paper-deterioration research group. Blame is aimed at acidic processing chemicals, lower rag content among responsible factors. Virginia State Library, which undertook study, found paper made with certain alkaline chemicals, plus calcium carbonate as filler-buffer, produced papers of superior permanence qualities.

▸ **"Earmarked" sponsored R&D in engineering schools was carried out at the $71-million level in 1958,** according to the National Science Foundation. Of this, the Federal Government supplied $48.6 million, private industry $10.3. The schools put up another $10.5 million, plus an additional $3.5 to cover indirect costs of outside-sponsored project work, from their own funds. Study was made to provide basis for NSF allocations of "un-earmarked" funds this year, which are based on a percentage of previous sponsorship level.

▸ **Carbon tetrachloride by chlorination of carbon disulfide from low-cost, sulfur-bearing fuel oil** offers attractive advantages over direct chlorination of methane, according to Taylor Fibre Co.'s Carlisle M. Thacker. Taylor offers the fuel-oil process. Trouble with direct chlorination is the 0.95 lb HCl produced with each lb of CCl_4 — which can today be economical, maintains Thacker, only if at least 75% of the chlorine value can be extracted consistently from the byproduct HCl.

▸ **Thin polyurethane foam constructions not previously feasible can be made with new Du Pont process** which introduces Freon or air bubbles under pressure into liquid mixture of foam ingredients. By expanding mixture before start of chemical (gelling) reactions, Du Pont froth process reduces final expansion to only three- to six-fold. Froth can be poured, knifed smooth, or otherwise processed without collapse.

▸ **Unduly high exports of previous years distort recent U.S. export declines,** says Michigan University director of Business Executives Research Conference, Laurence P. Dowd. About two-thirds of the decline since 1957 is so attributable, according to Dowd, who feels that pricing as related to "cheap" labor is a minor factor. Dowd's analysis appeared in July *Journal of Marketing.*

▸ **Pure Oil Co. has set up "scientist" and "research" titles** which carry status and remuneration comparable to the usual administrative ladder pattern. System was put into effect at the firm's Research Center at Crystal Lake, Ill., under Hugh L. Hemmingway, Pure's research director.

▸ **Texaco has divided staff research functions between five new managers,** which makes the manager total 10. Others head lab installations in Texas, California, and Beacon, N.Y. New staff functions will be planning & information, technical services, administration, and products & processes divisions of commercial development. The five new managers will headquarter at the Beacon Research Center. All will be responsible to Wayne Kuhn, general manager, according to Leb C. Kemp Jr., v-p Research.

▸ **A new business staff-function, "director of intelligence services,"** is advocated by Marion Harper Jr. of McCann-Erickson, Inc. Speaking recently before the Philadelphia chapter of American Marketing Assn., Harper voiced concern over the "information revolution" which is heaping upon management more facts and more specialist services than present methods and responsibilities can accommodate. Harper would foster the development of a "new profession" — would have it not only collect, digest facts & figures, but also propose strategy and policy. The actual decision-making would be limited to a few.

From page 8

Pennsalt Chemicals Corporation which has just completed $6-million modernization of its chlorine-caustic plant in Wyandotte, Michigan, and recently put into operation its new 34,000 sq ft blending, warehousing and distribution center at Atlanta, Georgia, has awarded a contract to **Catalytic Construction Company** of Philadelphia for engineering, procurement and construction of an alkyl alkanol amines plant in Wyandotte.

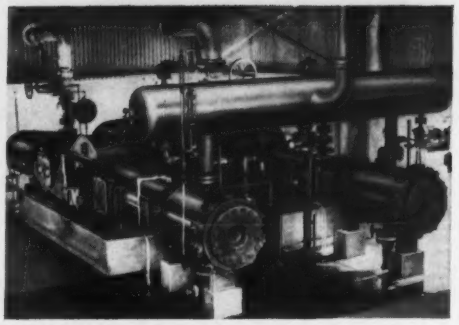
Scheduled for completion in late 1960 at estimated cost of $1½ million, facility will use improved, completely continuous process developed by Pennsalt which will triple Pennsalt's production of this group of amines.

Chlorine-caustic plant modernization included replacement of some 5000 old diaphragm-type electrolytic cells with 200 large, modern, 30,000 amp cells.

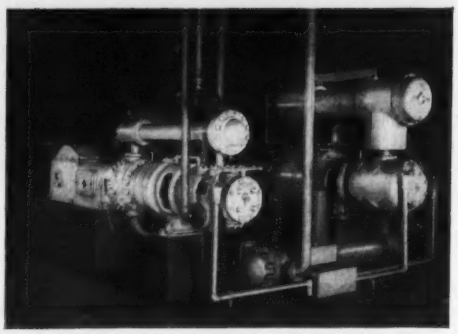
Catalytic Construction Company also has been awarded a contract by the Firestone Plastics Company, division of the Firestone Tire and Rubber Company, for engineering, procurement and construction assistance in the expansion of Firestone's PVC resins plant at Pottstown, Pa. Facilities are expected to be completed and in operation by early 1961.

Three construction projects are being launched by **Allied Chemical.** Various grades of low-molecular weight polyethylene will be produced by plant being built for **Semet-Solvay Petrochemical Division,** at Orange, Texas. New facilities will increase annual output by 50%. **National Aniline Division** will locate fine-denier Caprolan nylon yarn plant at Irmo, S.C., on 500-acre site. To be completed late in 1961, plant will increase company's overall nylon fiber capacity to more than 80 million lb/yr. Polyether plant will be constructed by **Solvay Process Division** at Baton Rouge, La. June 1961 start up date is set for plant which will have initial capacity of approximately 20 million lb/yr.

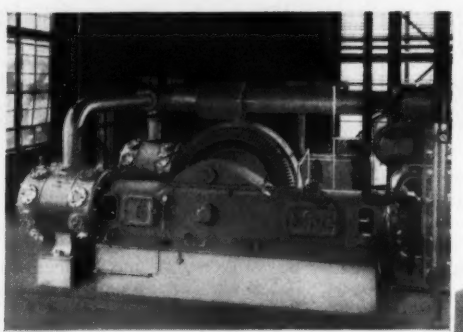
Neal, W. Va., is site of **Montecatini's** first American



Single-stage, steam-driven hydrogen recycling compressor in a modern refinery.



A 250 hp. four-stage compressor in an air separation process.



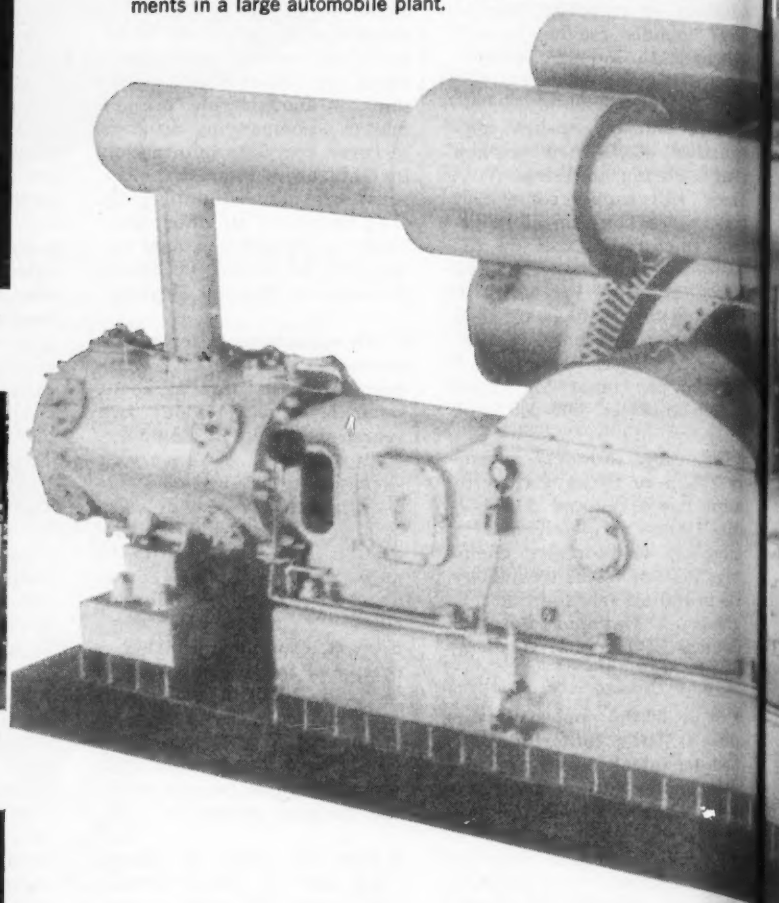
Three-stage, Class H-CE Compressor installed in a chemical plant.



Four 800 hp., O-CE Compressors serving an iron mine.

Horizontal

Four Class H-CE, four-corner Compressors supply all requirements in a large automobile plant.



Chicago Pneumatic offers a wide variety of designs of compressors in sizes up to 5,000 horsepower and for pressures up to 15,000 psig.

Included are the Class O horizontal duplex and the Class H horizontal four-corner in addition to the Class FE balanced-opposed.

The horizontal duplex machines are preferred for many applications because of their low speeds, greater accessibility, greater flexibility of cylinder arrangements for many multi-stage installations, and lower maintenance cost.

For complete information, write: *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, N.Y.*

manufacturing facility. Plant, designed to produce 25 million lb/yr of isotactic polypropylene for molding powders, will be built there by **Novamont Corporation,** wholly-owned American subsidiary of Montecatini.

Electolytic manganese facilities are being planned by **Foote Mineral Company** and **American Potash & Chemical Corporation.** Foote's plant, to be located at New Johnsonville, Tenn., represents a capital investment of over six million dollars and is expected to have 20 million lb/yr capacity. To be built in two stages, first unit of 10 million lb/yr is expected to be on stream in late 1961 or early 1962.

American Potash has launched work on five-million-dollar plant at Aberdeen, Miss., which will have initial capacity of 10 million lb/yr. Completion is planned for late 1961.

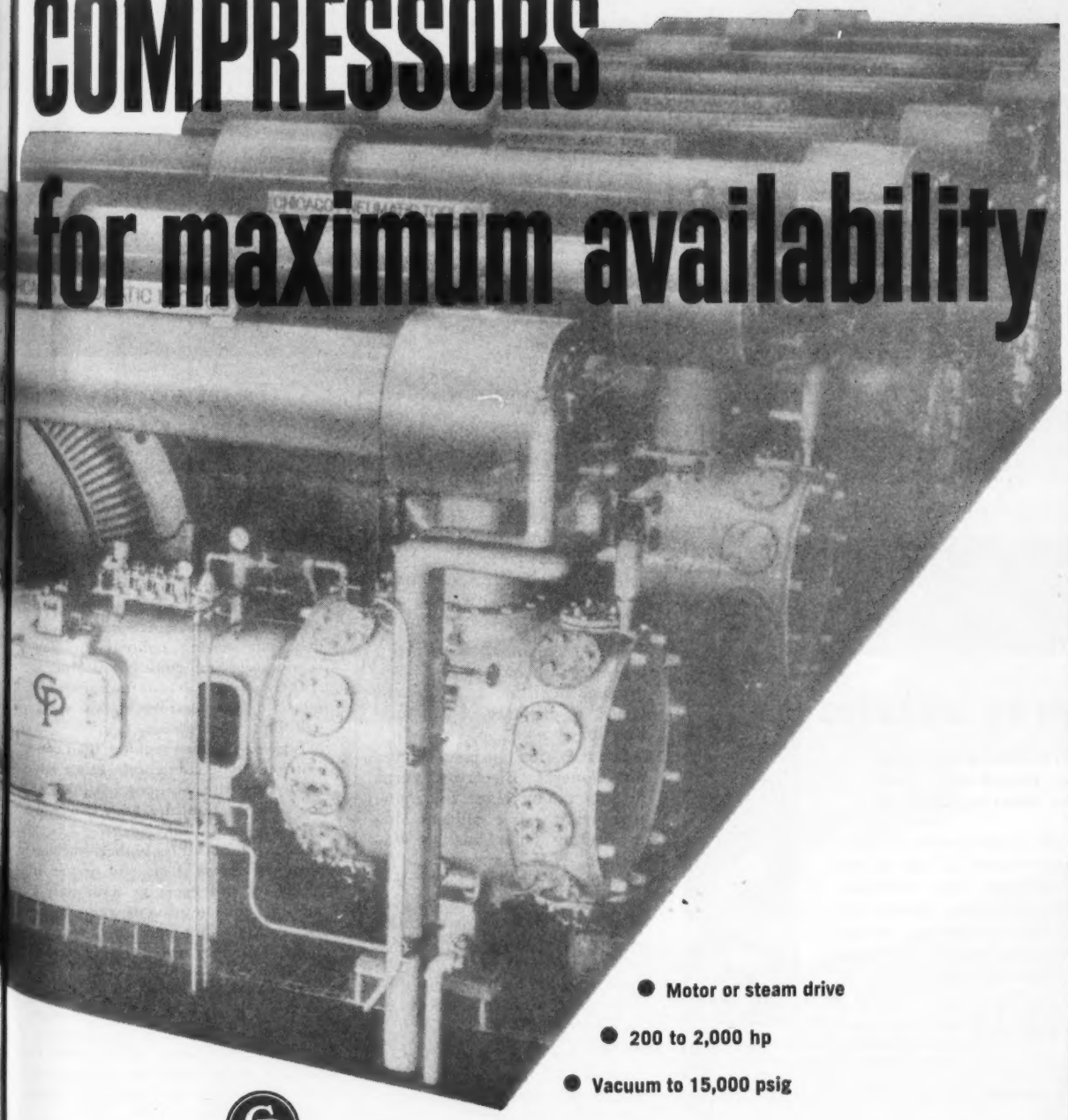
Reichhold Chemicals, Inc., will build plant with initial capacity of 50 million lb/yr and planned expansion to 100 million lb/yr to manufacture vinyl acetate monomer under a license agreement with Wacker Chemie G.M.B.H. of Munich, Germany. Site is to be announced.

The **Enjay Chemical Company,** division of Humble Oil & Refining Company, has completed 50% expansion of oxo alcohol capacity at Humble's Baton Rouge, La., refinery. Expansion increases total oxo capacity at Baton Rouge to 90 million lb/yr.

Columbian Carbon Company will construct plant in Houston, Texas, area to produce dispersions of carbon black in polyethylene, polypropylene and other resins. Expected to begin operation late this year, it is designed for eight million lb/yr capacity of cable as well as plastic pipe grade concentrate.

Three contracts totaling approximately four million dollars for design, engineering, procurement of materials and construction of new facilities at **Food Machinery and Chemical Corporation,** Baltimore,

Duplex LOW SPEED COMPRESSORS for maximum availability



● Motor or steam drive
● 200 to 2,000 hp
● Vacuum to 15,000 psig

Chicago Pneumatic 8 East 44th Street, New York 17, N.Y.

AIR AND GAS COMPRESSORS • VACUUM PUMPS • PNEUMATIC AND ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS

Check 4227 opposite last page.

A BATCH A MINUTE!

PRECISION MIXING

from a few pounds to over 16 tons, with

Daffin MACLELLAN BATCH MIXERS

WRITE FOR FREE BULLETIN X-19R



Used by industries the world over to mix and/or blend a complete batch of dry, free-flowing ingredients in one-minute cycles. Exclusive design prevents material separation or particle breakdown regardless of densities. Fast loading, unloading. Easy to clean.

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Binks spray nozzles

for washing, cooling, processing, humidifying, dehydrating, and hundreds of other applications.

You'll get the *right* nozzles quicker by calling Binks...manufacturers of one of the most complete selections ever produced.

There is a size and spray pattern for every purpose...with nozzles cast or machined from standard or special corrosion-resistant metals and materials.

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611

Binks

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3120-32 Carroll Ave., Chicago 12, Ill.
O. K. Binks, send me your comprehensive Spray Nozzle Catalog without obligation.

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COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

Check 4229 opposite last page.

Our Growing Industry

Md., chemicals complex have been awarded the **Fluor Corporation, Ltd.** Fluor will erect plants to produce unsymmetrical dimethylhydrazine, (a rocket fuel) and miticide. An existing rocket fuel plant is being expanded.

AviSun Corp. has selected New Castle, Del., as site for 100-million lb/yr polypropylene plant. Engineering contract has been awarded to **Bechtel Corp.**

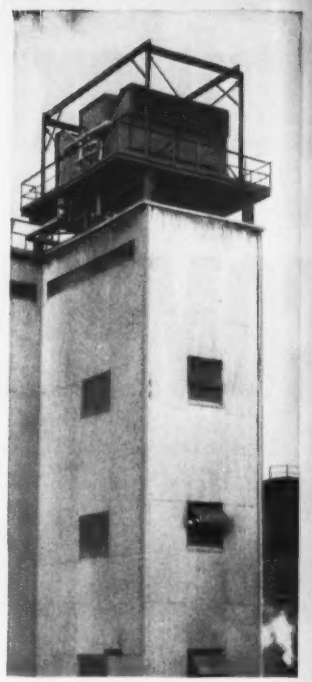
Houston Chemical Corporation, recently formed subsidiary of Chatham-Reading Chemical Corporation, has awarded contracts for erection of 80 million lb/yr ethylene oxide plant at Beaumont, Texas. **Scientific Design Company, Inc.,** will design and construct plant.

Construction has been started by **Badger Manufacturing Company** on **Ashland Oil & Refining Company's** plant to convert petroleum into commercial quantities of naphthalene. Designed to produce approximately 75 million lb/yr of naphthalene and several million gallons of benzene, petrochemical unit will be integrated with Ashland Oil's Refinery near Ashland.

Shell Chemical Company will expand its styrene production facilities at Torrance, Calif., to capacity of 210 million lb/yr.

Construction has been started on General Electric's three million dollar plant for manufacturing basic silicone intermediate chemicals at Waterford, N.Y. Expected to be in operation by late 1961, plant construction is part of 24-month, multi-million dollar expansion program. First phase of program was $1,000,000 silicone fluid finishing building expected to go into operation in November.

Celanese Corporation of America is moving to double its overall capacity for acrylate production by the end of 1960. Pampa, Texas, plant for the production of higher acrylate esters is being expanded to projected capacity of 14 million lb/yr of 2-ethylhexyl acrylate, butyl acrylate and glacial acrylic acid.



Trustworthy "CLOSED-CIRCUIT" Cooling

holds temperatures to close limits in entire processing column

● This Niagara "Aero" Vapor Condenser produces constant temperatures, assures sustained capacity to this fractionating column, holding production and quality uniform. A closed system, it avoids fouling troubles, holds temperatures within specified limits at all points.

It gives a higher vacuum than conventional type condensers, effectively separating the non-condensibles at the condensate outlet, with sub-cooling after separation.

It produces this higher vacuum with use of less steam and power. It holds its full capacity with only a nominal consumption of water, using air as the cooling medium. It answers the question of water supply or disposal.

Mounted directly on the steel structure of the evaporator or distillation column, installation is simple, operation is dependable, maintenance is neither troublesome or expensive. For description and capacities write for Bulletin 129.

NIAGARA BLOWER COMPANY

Dept. CP-9, 405 Lexington Avenue
NEW YORK 17, N. Y.

District Engineers in Principal Cities

Check 4230 opposite last page.

THAT'S INTERESTING

Clearing the air

Clearing the atmosphere of pollution would be much simpler if more autos had only six cylinders and car owners kept their engines tuned up, the Air Pollution Control Association was told during its meeting in Cincinnati.

Eight-cylinder engines give off twice as many hydrocarbon-bearing fumes as do six-cylinder engines.

An idling engine, properly tuned, gives off half as many hydrocarbons as one improperly tuned.

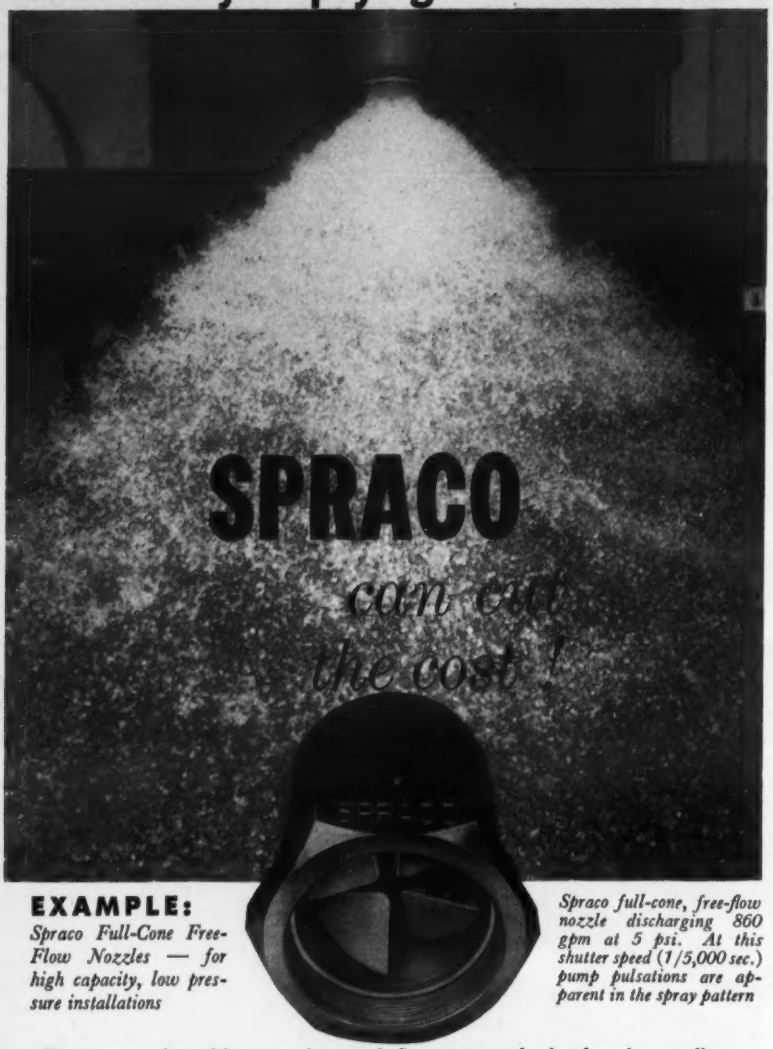
Starched paper

Dialdehyde starch added to pulp produces paper with wet strength over nine times that of untreated paper, USDA chemists have found. Starch is made from surplus corn, wheat or grain sorghum.

For more information on product at right, specify 4231 see information request blank opposite last page.



What are you paying for SPRAYING?



EXAMPLE:
Spraco Full-Cone Free-Flow Nozzles — for high capacity, low pressure installations

Spraco full-cone, free-flow nozzle discharging 860 gpm at 5 psi. At this shutter speed (1/5,000 sec.) pump pulsations are apparent in the spray pattern

To answer a long felt processing need, Spraco recently developed a totally new line of full-cone, free-flow nozzles for high capacity, low pressure installations where clogging is a problem and a full-cone spray a necessity. Featuring streamlined internal vane construction with maximum vane openings, they offer minimal flow resistance, virtually eliminate clogging.

Now widely used in cooling towers, coke quenching, aerating and purifying water supplies, and a host of chemical processing applications, Spraco Full-Cone Free-Flow nozzles are another excellent example of how Spraco cuts the cost of spraying by increasing the efficiency of the system.

What's your spray nozzle problem? Spraco offers the most complete range of nozzle sizes and capacities available anywhere, always in stock, and made from bronze, cast iron, stainless steel, or, to order, from any special machineable material.

Write today for the most comprehensive spray nozzle catalog ever published. Complete, accurate performance data for each of the hundreds of spray nozzles in the line.

SPRAY ENGINEERING COMPANY, *105 Cambridge Street, Burlington, Mass.*

SPRACO



Check 4232 opposite last page.

Watching Washington

Federal Labeling Law Goes into Effect

Chemical processors who manufacture some 300,000 household products are now subject to a new Federal Labeling Law.* It requires warning labels on potentially hazardous substances sold in interstate commerce. Information for the user and for the physician called in to treat an accident case must appear on every label. Packages not labeled according to the law are subject to seizure and condemnation. The new legislation will also provide a model for state regulation of these products.

The Law is the first of its kind since the outmoded Federal Caustic Poison Act of 1927 which called for the labeling of only 12 caustic and corrosive alkalis and acids. Not subject to the new regulations are products already covered by the Food, Drug and Cosmetic Act and the Federal Insecticide, Fungicide and Rodenticide Act.

Although the Law goes into effect immediately, no penalties will be imposed for six months, and in certain cases for 18 months beyond that.

Basic provisions — This new rule provides that a hazardous substance intended or suitable for household use is misbranded unless it bears a label on the container stating conspicuously:

1) The name and place of business of the manufacturer, packer, distributor or seller.

2) The common or usual name (or the chemical name if there is no common or usual name) of the hazardous substance, or of each component which contributes substantially to its hazard, unless the Secretary of Health, Education and Welfare by regulation permits or requires the use of a recognized generic name.

3) The signal word "Danger" on substances which are extremely flammable, corrosive or highly toxic.

4) The signal word "Warning" or "Caution" on all other hazardous substances.

5) An affirmative statement of the principal hazard, such as "Flammable," "Vapor Harmful," "Causes Burns," "Absorbed Through Skin" or a similarly worded descriptive of the hazard.

6) Precautionary measures describing the action to be followed or avoided.

7) Instruction, when necessary of appropriate, for first-aid treatment.

8) The word "Poison" for any hazardous substance which is defined as "highly toxic."

9) Instructions for handling and storage of packages which require special care in such matters.

10) The statement "Keep out of the reach of children," or its practical equivalent.

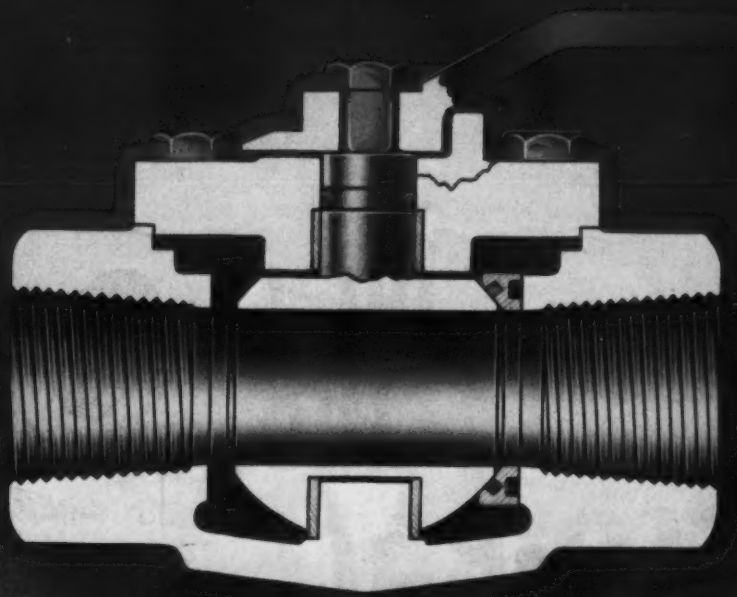
What is affected — In order to come within the basic definition of "hazard-substance," a substance (or mixture) must meet two conditions. First, it must be "toxic," "corrosive," an "irritant," a "strong sensitizer," "flammable," or be a substance which "generates pressure through decomposition, heat or other means." (All of these terms except the self-explanatory phrase, "generates pressure through decomposition, heat, or other means," are defined in the Bill.

A "hazardous substance" must be a substance (or mixture) which "may cause substantial personal injury or substantial illness during or as a proximate result of any customary or reasonably foreseeable handling or use, including reasonably foreseeable ingestion by children."

How much is substantial? — According to the House Com-

* See "Watching Washington," May CP, p. 90.

....how can 1 valve replace 3?



Better **FLOW** *than a* **GATE...**

but, unlike gates, the *FLO•BALL* valve doesn't freeze or jam . . . it never leaks . . . the seats don't score . . . it requires no maintenance . . . and just a ¼ turn opens or closes it.

Better **SEALING** *than a* **GLOBE...**

but, unlike globes, *FLO•BALL* gives zero leakage . . . in both directions *without* seat distortion . . . closes easily without massive operators . . . gives more than twice the flow . . . and the fastest action of any valve made.

Better **RELIABILITY** *than a* **PLUG...**

but, unlike plugs, *FLO•BALL never* needs lubrication . . . never freezes, never leaks, requires no maintenance . . . yet it has greater flow capacity than any plug . . . and the *lowest* torque in the industry.

FLO•BALL® does it...and does it better!

Hydromatics, Inc.
LIVINGSTON, NEW JERSEY

FLO-BALL

Mail this postage-free card today!

Bearing-fixed **FLO•BALL** valves are stocked with flanged or screwed ends, full or reduced port, in standard sizes from ⅛" to 10". They are made to standard ASA dimensions in carbon steel and 316 stainless steel.

Gentlemen:

Perhaps your bearing-fixed **FLO•BALL** valves can fill my applications. I require valves for_____

_____ in these sizes_____.

I now use ball valves in these sizes_____.

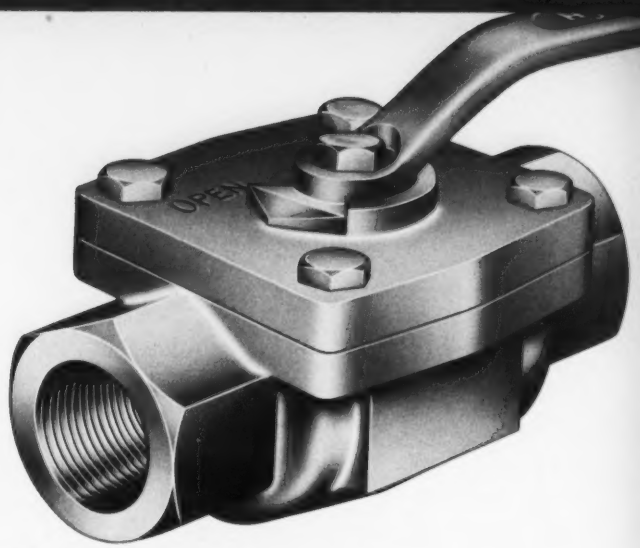
PLEASE: ☐ Have salesman call ☐ Send technical data

My name_____ Position_____

Company name_____

Address_____

City_____ State_____



...how the FLO•BALL® reduces your valve costs 3 ways!

1. Reduce initial costs... *by using fewer valves per system. FLO•BALL valves are used in place of gates, globe or plugs.*

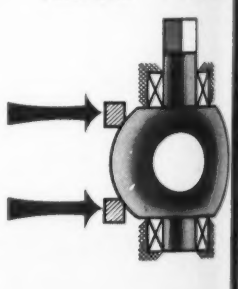
2. Reduce inventory costs... *by standardizing on one type valve for all applications requiring gates, globes or plugs.*

3. Reduce maintenance costs.. *the FLO•BALL high reliability means less maintenance . . . no lubrication, no freezing, positive sealing. The top loading and replaceable seat reduces overhaul and start-up costs.*

Principles of Operation

In the bearing-fixed FLO•BALL valve all pressure forces exerted on the ball are transmitted to low-friction bearings. The pressure balanced seat results in a sealing force which is designed to insure positive sealing without seat distortion, and to minimize seat-resisting frictional forces. The combination of these low frictional forces accounts for the extremely low operating torque.

FLO•BALL VALVE
Fixes ball • Floats seat



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FIRST CLASS PERMIT NO. 40



Postage Will Be Paid By

Hydromatics, Inc.

Livingston, New Jersey

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mittee report on the Bill, the term "substantial" in the expression, "substantial personal injury or substantial illness," should be read in the light of the purposes of the bill:

"On the one hand, it is not intended to impose the impracticable and self-defeating requirement of cautionary labeling against wholly insignificant or negligible illness or injury, such as the very temporary indisposition that a child might suffer from eating a piece of the standard type of toilet soap.

"On the other hand, the term 'substantial' is not intended to limit the requirement of cautionary labeling to situations in which the injury or illness to be guarded against would be severe or serious."

The House Committee noted further that the Bill requires that there be a risk of the occurrence of injury or illness "during or as a proximate result of any customary or reasonably foreseeable handling or use" of the package or substance."

"This phrase again," the report said, "is intended to be read in the light of the purpose of the bill. This purpose includes customary or reasonably foreseeable accidental handling or use, not only by the purchaser or intended user of the product, but by others in the household, especially children who are prone to swallow or tamper with household aids left within their reach.

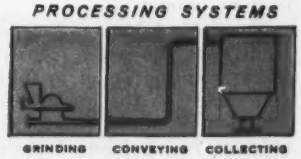
"It is common knowledge that the very color and attractive modern packaging of a poisonous household substance, such as furniture or silver polish, may induce a small child to investigate and to swallow it."

One big objection to the industry-backed Bill: It will mean factory inspection by FDA agents of unfinished as well as finished products.



If your present product recovery system is not delivering maximum efficiency, you may be paying an exorbitant price for dust that is merely blowing away. Add to this the possible damaging effect on equipment, on employee morale, on general plant appearance and community relations. The most practical and *economical* solution of any dust problem is the MIKRO-PULSAIRE Collector, now available in new flexible modular units designed to meet any required capacity however large or small . . . attested recovery efficiency 99.9% plus . . . absolutely no moving parts, internally or in the gas stream . . . 4 or 5 times the capacity of conventional bag houses per unit of bag area. For the toughest dust collection jobs, call on our engineering staff, and the MIKRO-PULSAIRE.
Ask for Bulletin 52A-1.

PROCESSING SYSTEMS



MIKRO-Products
PULVERIZING MACHINERY COMPANY
60 Chatham Rd., Summit, N. J.
A Division of American-Marietta Company

SPAN THE GLOBE

REPRESENTATIVES throughout the United States, Continental Europe, British Isles, Canada, Mexico, Central and South America, West Indies, South Africa, India, Japan, Philippines, Australia and New Zealand.
MANUFACTURING FACILITIES: United States, Canada, Continental Europe, British Isles.

Check 4234 opposite last page.

For more information on product at left, specify 4233 . . . see information request blank opposite last page.

U.S. Coal Research Office to dig deeply for new ideas

Rejected by earlier Congresses, a coal-research bill was signed into law this past session. An office of Coal Research is being established by the Department of Interior to administer a $2 million annual program aimed at increasing the output and uses of coal.

Secretary of the Interior Fred A. Seaton explained that the new Coal Research Act was strongly supported by the Department to foster "research that would do the greatest possible good in the shortest possible time for a deserving industry."

The Act provides that the Office of Coal Research will be aided by advisory groups to assist in the screening and selection of coal-research projects. Secretary Seaton said that broad representation from all segments of the coal industry will be marshalled to make the research program a progressive, dynamic operation.

Color Additives Law keeps Delaney Clause

Scientific panel's advice not to be binding

Color-additives amendments to the Food, Drug, and Cosmetic Act have been signed into law by the President. The Law adopts for all colors the basic tolerance-setting principle of the Food Additives Amendment of 1958. Also written into this legislation is the ubiquitous Delaney Clause, banning the use of an additive which (when used in any amount) induces cancer in man or animal.

The Color Additives Amendment does, however, provide for a scientific panel to study and report on the question of whether an additve is a carcinogen. Any person adversely affected by an FDA regulation may request referral to an advisory committee. The report of this committee is not binding but is made part of the hearing record.



PURITY STANDARDS WITH DICALITE FILTERAIDS

DICALITE OFFERS NEW CUSTOMIZED FILTERAID SERVICE

Today, standards of purity are tightening in every field—and tomorrow's will be higher still. But you can confidently meet both with the high-efficiency filteraids which Dicalite is producing right now.

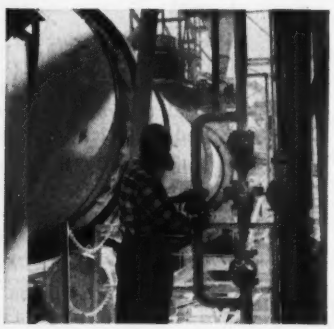
Today, with new processing advances made through continuing research, Dicalite can custom-engineer a filteraid made to precisely match your individual purity problem.

If your filtration must be so sharp that it removes particles too small to be seen with the optical microscope, a Dicalite Filteraid can do it. Or, if fast flow rates and increased production are your need, Dicalite can help you achieve that.

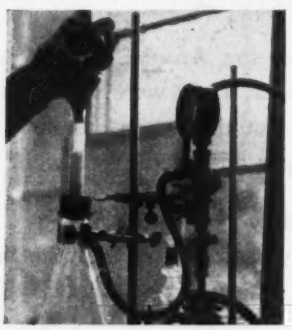
Your Dicalite man will be glad to advise with you on any filtration problem and help you determine if a customized filteraid will advance your processing.



Careful strata selection provides the best crude for each filteraid's final requirements.



New processing refinements, including special calcining methods, control filteraid characteristics with an accuracy never before possible in any plant.



With more than 22,000 quality control tests every month, the Dicalite plant laboratories hold every filteraid grade to rigid specifications.



New automatically-controlled packing and pressure-palletizing is the final step in efficient modern operation.

Dicalite®
Dicalite Department
Great Lakes Carbon Corporation
612 So. Flower Street, Los Angeles 17, Calif.

The product I am filtering is _____

Have Dicalite man phone for appointment ☐ Send Information ☐

NAME _____

TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ ZONE _____ PROV. _____

CP-3

Check 4235 opposite last page.

Spotlight On People

John W. Brooks and **Richard W. KixMiller** have moved up to executive vice-presidencies and four division presidents have been named in a divisional reorganization by Celanese Corporation of America.

Under the reorganization, operating divisions have been increased from three to four. Mr. Brooks will be responsible for Celanese Fibers Company and Celanese Plastic Products Company operations. Mr. KixMiller will have charge of Celanese Chemical Company and Celanese Polymer Company (the latter is a new division created by realigning functions of the old plastics division) operations.

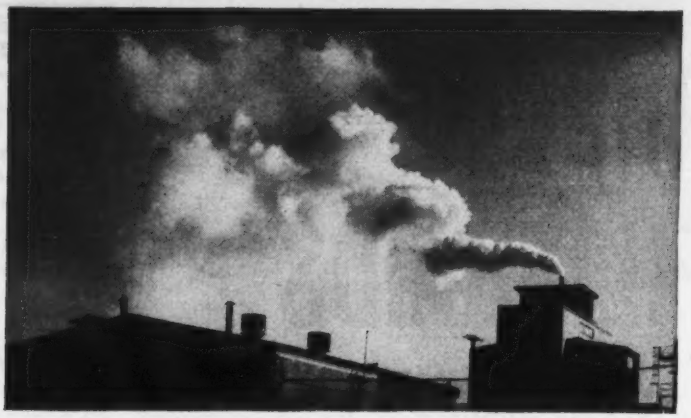
Division presidents are **Peter H. Conze,** Celanese Fibers; **William P. Orr,** Celanese Polymer; **David Taylor,** Celanese Plastic Products; and **James H. Worth,** Celanese Chemical.

In a move preceding the reorganization, **Robert L. Mitchell** was named vice president, planning for Celanese Chemical.

Following reorganization, **James W. Flynn** was named vice president and director of marketing, and **Dr. Russell N. Clark,** vice president and technical director, Celanese Polymer. Edward W. Ward was named vice president and director of marketing and Frank B. Cameron, vice president and manager of manufacturing for Celanese Plastic.

Henry S. Winnicki has been named vice president, Chemical Divisions, Food Machinery and Chemical Corporation. The corporation also announced resignation of **Dr. Emil Ott** as vice president for research and development, Chemical Divisions. He will continue as part-time consultant.

Other Humble Oil & Refining Company promotions include: **Dr. Richard J. Gonzalez,** coordinator of finance and economics since Humble's recent reorganization, to board of directors; **Herman P. Pressler Jr.,** from divisional vice president to vice president and manager of public relations for Humble Oil & Refining Company; **Dr. Charles F. Jones,**



Before scrubber was installed — visible cloud is composed largely of water with about 0.5% sulfur trioxide

THE CHEMICO VENTURI SCRUBBER MAKES THE BIG DIFFERENCE



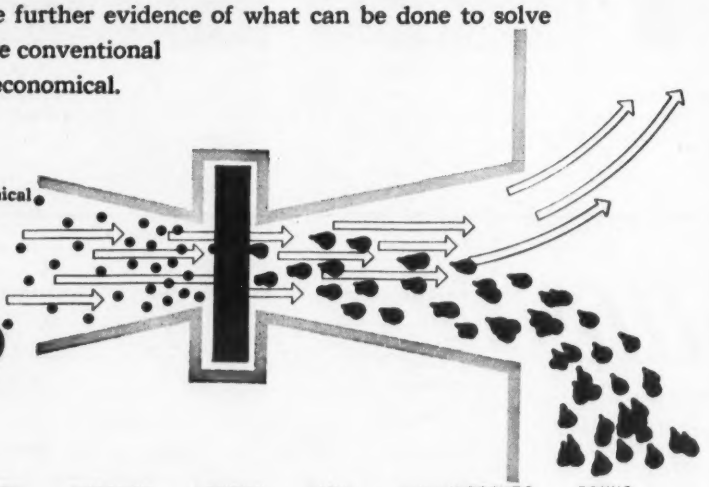
After scrubber was installed — water vapor has diminished considerably, sulfur trioxide content is practically nothing

With sulfur trioxide fumes being vented to the air in a thick vapor fog, Ansul Chemical faced an air pollution problem common to many chemical producers. They were willing and anxious to comply with community requests for pollution control, but they were unable to find a scrubber which could rid the stack of both the water vapor and the SO_3 as well.

While virtually any scrubbing device was capable of removing the water vapor, only the Venturi scrubber was effective in removing the acid fumes. By removing all but the last traces of SO_3 the Venturi scrubber gave further evidence of what can be done to solve really tough gas cleaning problems where conventional cleaning devices prove ineffective or uneconomical.

FULL DETAILS AVAILABLE

For your copy of a brochure giving complete data on Chemico Venturi gas scrubbers, or for technical assistance on a specific problem, write to Chemico at the address below.



CHEMICO

CHEMICAL CONSTRUCTION CORPORATION
Gas Scrubber Division
525 West 43rd Street, New York 36, New York

CHICAGO DALLAS HOUSTON PORTLAND, ORE. TORONTO LONDON PARIS JOHANNESBURG TOKYO

Check 4236 opposite last page.

PEOPLE

from manager of Humble Division manufacturing department to newly-created position of manager of economics and planning department of parent firm.

Henk J. Schot has joined Millmaster International, Inc., as vice president—a move which will permit Millmaster to expand export-import activities.

J. W. (Bill) Everson has been appointed manager of the market research department of The Dow Chemical Co.

Changes in Union Carbide management take **Herman K. Intemann** from president, Union Carbide Metals Company, to director of purchases for Union Carbide Corporation. He is succeeded by **William H. Feathers,** formerly president of National Carbon Company. **James R. Johnstone** becomes president of National Carbon Company.

Other division-level changes saw **Fred B. O'Mara** named vice president-production of National Carbon; and **Paul L. Alspaugh,** vice president of Union Carbide Olefins Company.

Frank M. Norton advances from executive vice president to president of Plastics and Coal Chemicals Division, Allied Chemical Corporation.

John D. McPherson has been elected president and a director of Jefferson Chemical Company, Inc., succeeding George R. Bryant, retired.

J. Q. Cope has been appointed a vice president of California Chemical Company. He was formerly vice president of the California Research Corporation.

A. W. Schubert has been elected president of Emery Industries, Inc., succeeding **John J. Emery** who takes over newly-created post of chairman of the board. Mr. Schubert formerly was executive vice president.

J. A. Hughes and **W. H. McConnell** are newly-named senior vice presidents of Diamond Alkali Company.

O. V. Tracy who retired August 1 as president of the Esso Standard Division, Humble Oil

& Refining Company, has been succeeded by **William W. Bryan**, vice president for marketing on Humble's headquarters staff.

T. J. Kinsella has been named general manager of Allied Chemical's commercial development department. Formerly president of Allied's Plastics and Coal Chemicals Division, he has been assigned recently to the company's head office in connection with special studies related to corporate planning.

Two new departments for process development have been formed in the Chemicals Division of Olin Mathieson Chemical Corporation. **M. C. Metziger** is director of the development department for Blockson Chemicals; and **B. H. Nicolaisen,** director of the development department, industrial chemicals.

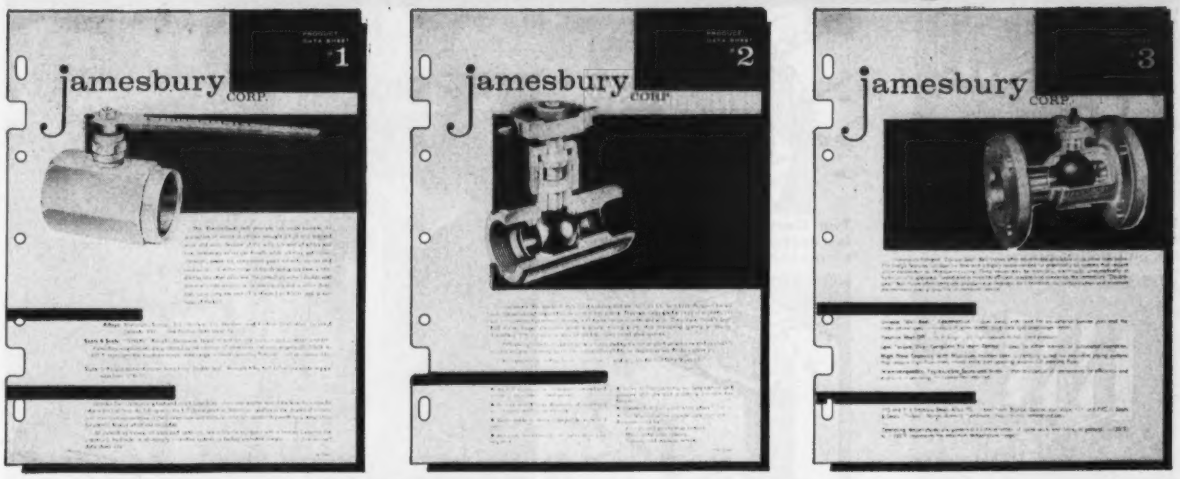
E. C. Slaght Jr. has been appointed technical director and assistant to the president of Newport Industries Company, division of Heyden Newport Chemical Corporation.

General managers have been named for two new divisions formed from The Permutit Company, divisions of Pfaudler Permutit, Inc. Chemical activities have been consolidated in the Ionac Chemical Corporation with **Robert Van Iderstine** as general manager. A new industrial division will continue to do business as The Permutit Company with **Julius Yetka** as general manager.

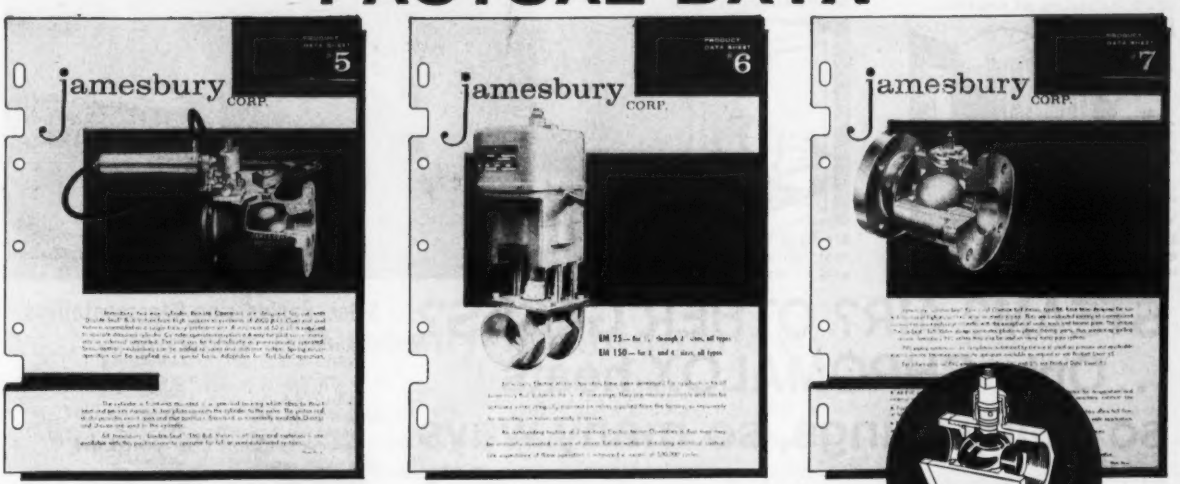


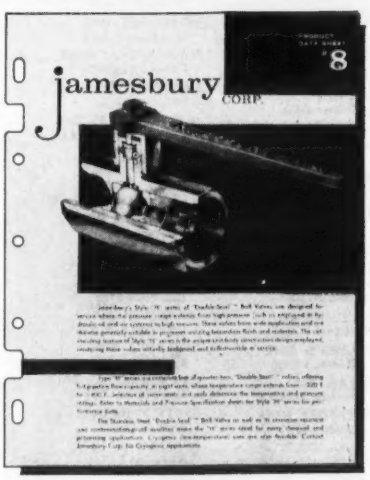
"I am ringing him!"

Yours For The Asking!



FACTUAL DATA





126-0

JAMESBURY BALL VALVES
HELPING BUILD OUR NUCLEAR NAVY

on Jamesbury

BALL VALVES

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Get the full story on Jamesbury Corp.'s complete line of "Double-Seal" Ball Valves and accessories. Learn why the Jamesbury "Double-Seal" Ball Valve has been labeled "as versatile as industry itself". Get all the facts on materials, sizes, etc. They are yours for the asking: the facts about Jamesbury Corp. — the nation's foremost exclusive manufacturer of Ball Valves.

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Name..... Title.....

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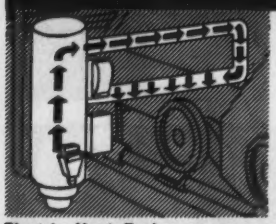
Address..... City..... State.....

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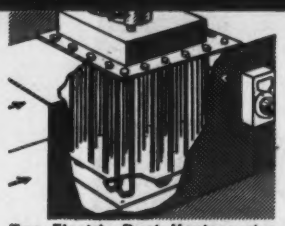
Distributors in Principal Cities

Check 4237 opposite last page.

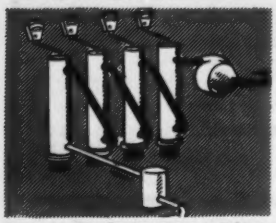
Call your CHROMALOX Man for heating answers



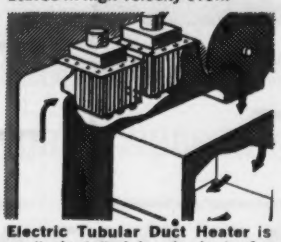
Electric Heat Exchanger superheats steam to 750°F for setting ink on printing press.



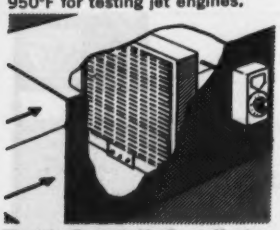
Two Electric Duct Heaters give fast heat-up and accurate temperatures in high velocity oven.



Electric Air Preheaters produce high volumes of air heated to 950°F for testing jet engines.



Electric Tubular Duct Heater is easily installed in air ducts for temperatures up to 1200°F.



Electric Forced Air Duct Heater easily fits ducts for comfort heating or process heat to 950°F.



Electric Strip Heaters are low-cost, uniform heat source for natural convection ovens to 750°F.



STEAM? AIR? OTHER GASES? ...Only CHROMALOX heats so many things, so many ways

There's one best way to do any job. And you get the best results only by using that one best method.

Regardless of what your heating problems may be . . . your best chance of finding the best answer is to call your Chromalox Man.

- He represents more than 15,000 different types, sizes and ratings of electric heaters and heating elements . . . the world's largest line.
- He orders from the world's largest stock.
- And he is a heating expert . . . he understands your problem and can help you find the answer.

No matter what your heating problem is . . . solids, liquids or gases . . . call your Chromalox Man for the efficient, electrical answer. Or, check the boxes below, write your name, title, and address at the bottom of this page and mail the coupon to us.

81847

Edwin L. Wiegand Company
7500 Thomas Boulevard, Pittsburgh 8, Pa. • Churchill 2-6400

☐ Send me Catalog 60 (General Industrial heating applications).

☐ Send me specific information on the heating problems I have outlined on the sheet attached.

☐ Have a Chromalox Representative contact me.

☐ Do not have a Chromalox Representative contact me.

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WICHITA, KAN. Amherst 2-5647

CHROMALOX ELECTRIC HEAT

Check 4238 opposite last page.

conventions and exhibits

Sept. 6-16. The Production Engineering Show coinciding with the Machine Tool Show will be held in Chicago. Exhibits at the Production Engineering Show will be held at Navy Pier, and the Machine Tool Show will be held at the International Amphitheatre.

Sept. 13-15. Chemical Exposition U.S.A., Statler Hilton Hotel, New York City — concurrently with the 138th National Meeting of the American Chemical Society, Sept. 11-16.

Sept. 15-18. Drug, Chemical and Allied Trades Association, 70th Annual Meeting, Sagamore Hotel, Bolton Landing (Lake George), New York.

Sept. 22-23. Chemical Market Research Association, broad economic picture in Europe and chemical market outlook in individual countries to be discussed, Wentworth-By-The-Sea, Portsmouth, New Hampshire.

Sept. 25-28. American Institute of Chemical Engineers, Mayo Hotel, Tulsa, Okla.

Sept. 26-30. Instrument Society of America, Instrument-Automation Conference and Exhibit, Coliseum, N.Y.

Sept. 27-29. National Agricultural Chemicals Association, Annual Meeting, Del Coronado Hotel, Coronado, Calif.

Oct. 6-7. Western Conference, National Association of Corrosion Engineers, San Francisco, Calif.

Oct. 6-8. Southeast Conference, National Association of Corrosion Engineers, Atlanta, Georgia.

Oct. 9-13. The Electrochemical Society, Meeting, Shamrock Hotel, Houston, Texas.

Oct. 11-14. Northeast Conference, National Association of Corrosion Engineers, Huntington, W. Va.

Oct. 17-18. American Coke and Coal Chemicals Institute, Annual Meeting, Greenbrier, White Sulphur Springs, W. Va.

. . . Meetings and shows of interest to the chemical industries

Oct. 17-19. Technical Association of the Pulp and Paper Industry, Plastics-Paper Conference, Hotel Syracuse, Syracuse, N.Y.

Oct. 17-19. Fall Meeting of the American Oil Chemists' Society, Hotel New Yorker, New York City.

Oct. 19-20. North Central Conference, National Association of Corrosion Engineers, Milwaukee, Wis.

Oct. 25-27. South Central Conference, National Association of Corrosion Engineers, Tulsa, Okla.

Oct. 29-*Nov.* 2. 25th Paint Industries Show, Sherman Hotel, Chicago, Ill.

Oct. 30-*Nov.* 2. Federation of Societies for Paint Technology, 38th Annual Meeting, Sherman Hotel, Chicago, Ill.

Oct. 31-*Nov.* 2. The 22nd Annual National Packaging Forum, Packaging Institute, Statler-Hilton Hotel, New York City.

Oct. 31-*Nov.* 4. American Management Association, Packaging Management Course, Hotel Astor, New York City.

Nov. 9-10. Chemical Market Research Association, Pittsburgh Hilton Hotel, Pittsburgh, Pa.

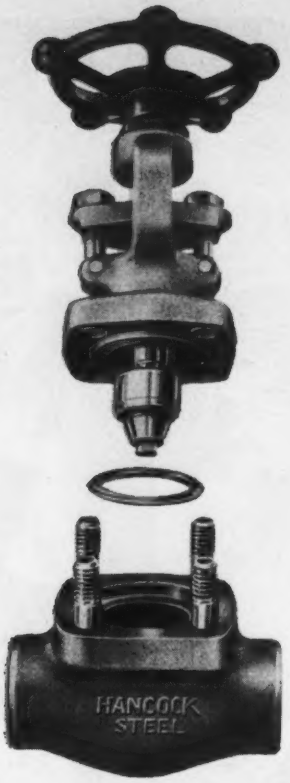
Nov. 14-16. The National Association of Corrosion Engineers, Canadian (Eastern Meeting) Montreal, Quebec.

Nov. 28-*Dec.* 2. The 24th National Exposition of Power & Mechanical Engineering, Coliseum, New York City.

Dec. 3-9. Chemical Specialties Manufacturers Association, 47th Annual Meeting, Hollywood Beach Hotel, Hollywood, Fla.

Dec. 4-7. American Institute of Chemical Engineers, Statler Hotel, Washington, D.C.

Dec. 8. Annual Meeting of the Synthetic Organic Chemical Manufacturers Association, Hotel Roosevelt, New York City.



NEW VALVE-OLOGY

shuts off costly maintenance

Hancock 600# Steel Valves incorporate new concepts in valve-ology that reduce valve maintenance and equipment down-time. The forged steel bonnet and body have butting flanges so strong no distortion is possible. The flanges form a bonnet joint that utilizes the sealing power of a Flexitallic* gasket so effectively not even pressures exceeding ten times the rating of the valve can cause a blowout.

Hancock valve-ology makes full use of stainless steel to reduce your valving cost. Seat, disc, stem, swing bolts and nuts, thread bushing, packing gland follower—all are stainless steel. Globe, Angle, "Flocontrol", Lift Check, and Hi-Pressure Drop designs available. A high degree of standardization simplifies servicing and inventory needs. Your industrial supply distributor will gladly give you full details on Hancock Valve quality and performance. Phone him today.



Hancock 600# Steel Globe Valve. Type 5500 Line. Sizes: ¼" thru 2".

*Trademark of Flexitallic Gasket Company

HANCOCK STEEL VALVES

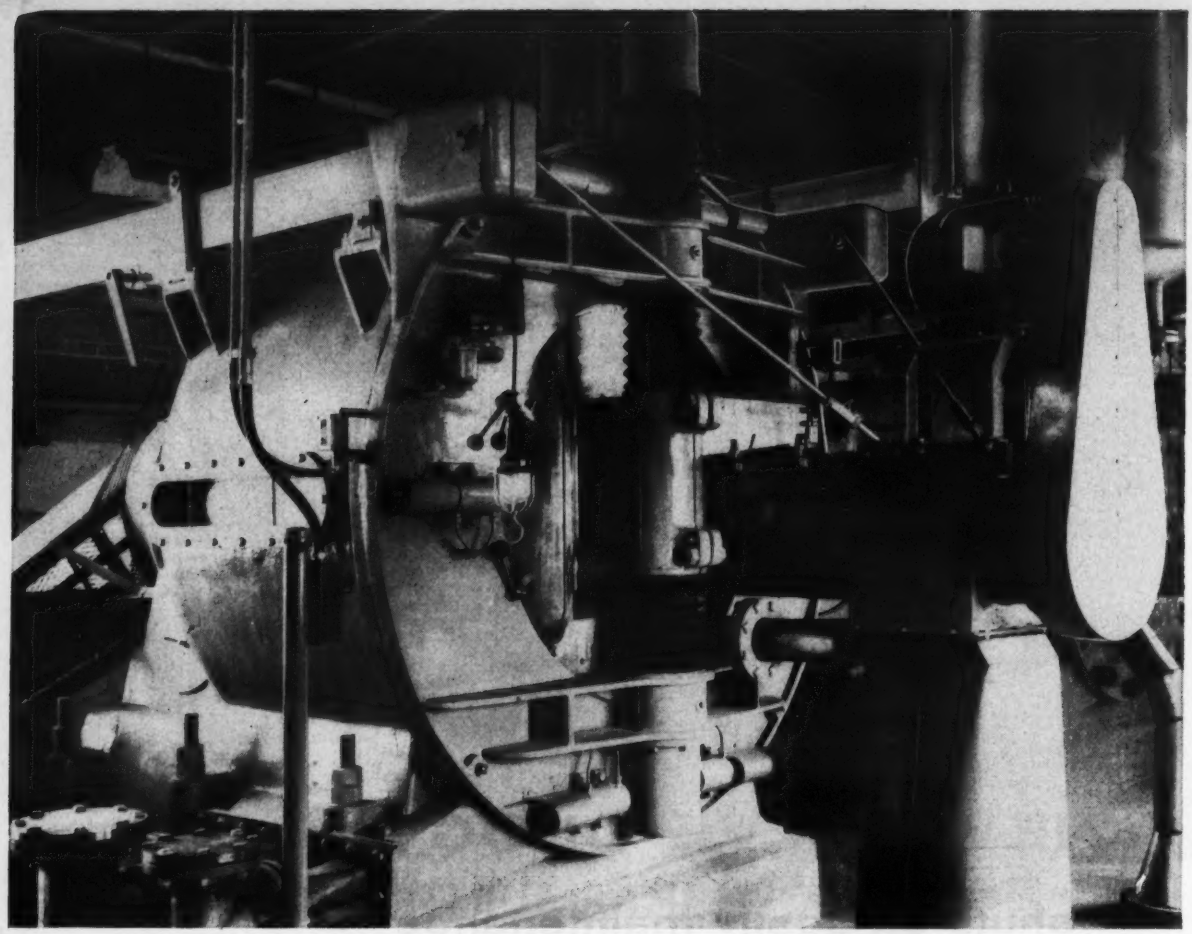
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In Canada: Manning, Maxwell & Moore of Canada, Ltd., Galt, Ontario

Check 4239 opposite last page.



IMMEDIATE SUCCESS

for this outstanding Centrifuge Plant

In a recent article, describing a sister plant, the following statement was made:

"Probably the most important pieces of equipment in the overall system are two big automatic-cycle-controlled, horizontal Reineveld centrifuges . . ."

Another example that "for TOP PERFORMANCE IT'S ALWAYS REINEVELD"

Full production was reached within three days from start-up in the new installation at Corn Products Company's Pekin, Illinois, Plant. Each of the 68" Automatic Reineveld Centrifuges handles about 1100 pounds of powdered corn starch every 7½ minutes. It dewaters a 22° Baume Starch Slurry containing 10-30 microns solids to an average moisture of only 33%. With material less difficult to dewater, this Reineveld could easily produce double this tonnage.

This highly efficient, space-saving installation operates completely automatic. The Reinevelds embody all the newest improvements and safety features, such as pneumatic locking devices, automatic brakes and thermo-couples on main bearings.

The patented bearing located at the center of gravity and other design features permit the Reinevelds to operate at higher G-forces, resulting in drier products even at exceptionally high tonnages.

HEYL & PATTERSON, Inc.

55 FORT PITT BLVD., PITTSBURGH 22, PA. • CO. 1-0750

Check 4240 opposite last page.

letters from readers

Heat exchanger survey

Sirs:

I am now preparing the "Heat Transfer Equipment" section for the fourth edition of Perry's *Chemical Engineers' Handbook.*

Would you be so kind as to assist me by sending a copy of "Survey of Heat Exchanger Use and Buying Practices," which was referred to on page 128 of the March 1959 issue of CHEMICAL PROCESSING.

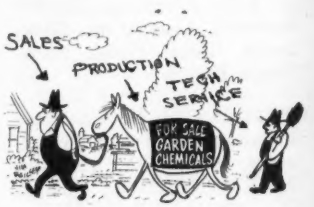
FRANK L. RUBIN
Downingtown Iron Works, Inc.
Downingtown, Pa.

For those of our readers without elephantine memories, the Report referred to by Mr. Rubin was the basis of an article "Tube Fouling heads list as major cause of heat exchanger breakdown," which began on p. 125 of the March 1959 CP.

That cartoon again!

Sirs:

I would like to request permission to reprint the cartoon, "Modified Version" shown on page 17 of the July 1960 issue of CHEMICAL PROCESSING.



I am Editor of a quarterly news letter, *News & Views* of the Central Indiana Section of the Society of Plastics Engineers, and the cartoon desired should greatly appeal to our many members who are involved in sales and technical service.

Thanks also for adding a little humor to a technical magazine. It keeps us all from taking ourselves and life too seriously.

B. H. BECKETT
Plastic Raw Materials Engineer
Western Electric Co., Inc.
Indianapolis

THAT'S INTERESTING

Pills pacify one in nine

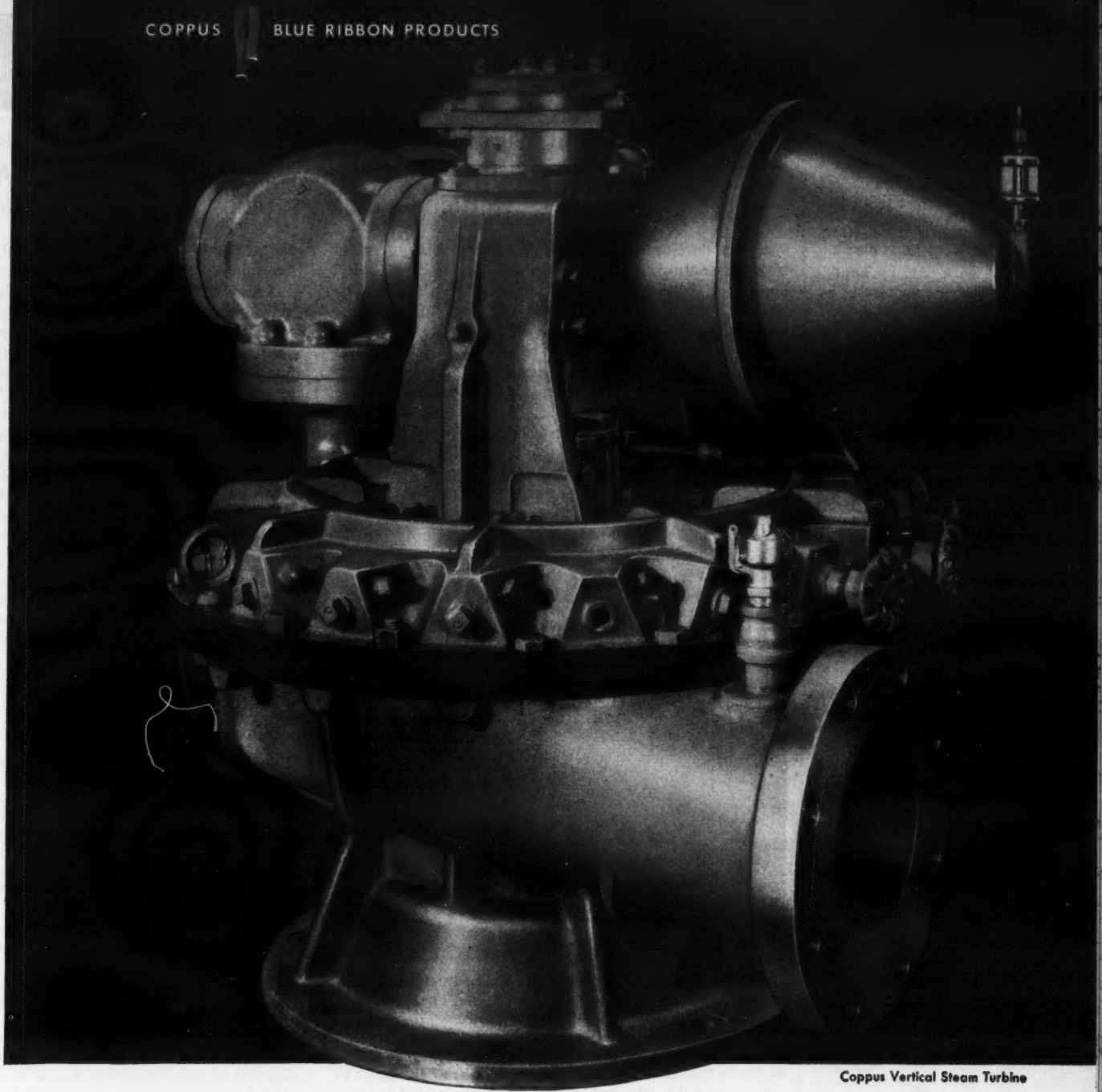
Less than one of every nine persons in the U.S. took tranquilizers in 1959, David D. Stiles, director of market development at Abbott Laboratories, says. His figure is based on 20,700,000 new tranquilizer prescriptions filled during year.

Reversing the field

Researchists, who are investigating the effects of great pressures on materials at the University of California's radiation lab, have found that at a pressure of about 700,000 atmospheres the chemical bonds in iodine crystals are broken down causing the crystal to change from an insulator into a metallic form which readily conducts electricity.

For more information on product at right, specify 4241 see information request blank opposite last page.

COPPUS BLUE RIBBON PRODUCTS



Coppus Vertical Steam Turbine

THE MARK OF QUALITY — There's no better test of a turbine's quality than performance. And the new, ruggedly designed, power-packed Coppus Turbines pass all performance tests with top honors! Small wonder. Coppus quality is literally designed and built into them. Their super stamina is the end-product of painstaking craftsmanship, finest materials and methods, thorough testing and control. Each truly deserves its Blue Ribbon . . . assurance of *complete* reliability.

Typical Coppus Blue Ribbon features are: *totally enclosed governor . . . totally enclosed and independently operated safety trip . . . easily replaceable packing and bearings . . . multiple steam nozzle control . . . brake rim for added safety . . . wide bucket "L" type wheel (optional) for minimum water rate.* You get higher efficiency operation . . . less down time . . . lower maintenance costs.

Coppus Turbines are built to customers' specifications, including API and NEMA standards. Send for Catalog 200. Get complete details on Coppus Turbines. Sizes from 1 HP to 250 HP. Write COPPUS ENGINEERING CORPORATION, 389 Park Avenue, Worcester, Mass. Sales Offices in *Thomas' Register*.

COPPUS
STEAM TURBINES

Engineers as researchers

Sirs:

I read with great interest the fine article in CHEMICAL PROCESSING on Phillips' receiving the NSPE's Industrial Development Award.

All engineers must work to destroy the traditional concept that they work only by applying knowledge acquired by others. Although engineers must research new concepts during the course of applying natural laws and basic data, their relative standing in these times of scientific cold war will deteriorate if they do not more eagerly probe for new knowledge as they go along.

The engineer of the future must have a more substantial strain of the researcher in him than is the present day impression held by the public. People are getting acutely conscious that our nation's best chance of survival rests at least as much on our success in probing further into the scientific unknown as merely on our ability to harness sheer weight of manpower to employ already known facts. Associating the engineering profession in the minds of the public with that prized ability is therefore vital to attaining genuine professional excellence.

PAUL ENDACOTT
President

Phillips Petroleum Company
Bartlesville, Okla.



"Alright Hubert! Which valve was it this time?"

Fred W. Stennis, Borden Chemical Co.

See why ALCOA ALUMINUM makes a good design habit

Requirement: Simple, low-cost heated lines to pipe high viscosity fluids
Key to Good Design: Specify UNITRACE and DUOTRACE, Alcoa's extruded aluminum pipes with integral steam chambers

With the development of UNITRACE® Piping, ALCOA created an entirely new technique for piping viscous fluids. Trace and product chamber are extruded in a single unit of light, strong, corrosion-resistant ALCOA® Aluminum. This integral steam-traced pipe eliminates the need for cumbersome, costly, inefficient pairing of separate pipes for steam and product. The resultant savings in initial cost are coupled with a major increase in the efficiency of heat application to the product piped.

Subsequent development of special flanges, elbows, adapter flanges and UNITRACE Trace Caps has made it possible to design and install completely integrated UNITRACE piping systems . . . compatible with standard piping components.

Now ALCOA has developed a new product, DUOTRACE,* to expand the design range of integrally traced piping systems. DUOTRACE contains not one but *two* trace chambers plus a product chamber in a single extruded aluminum pipe. This makes DUOTRACE the perfect solution to the need for recirculating tracing systems.

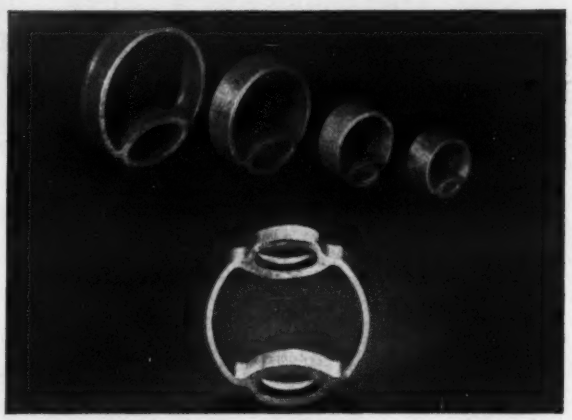
*Trademark of Aluminum Company of America

Today, the ingenuity of process industries designers has indicated intriguing new areas of potential use for both UNITRACE and DUOTRACE. Consider, for instance, the process economies which can result from the substitution of either UNITRACE or DUOTRACE for unit heat exchangers and preheaters.

Here you see an outstanding example of the way in which ALCOA is putting over 40 years of process industries experience to work to make aluminum your good design habit. You are invited to share that experience—through a series of engineering conferences which ALCOA is holding this year in a number of major cities. Your local ALCOA sales office will be happy to furnish details.

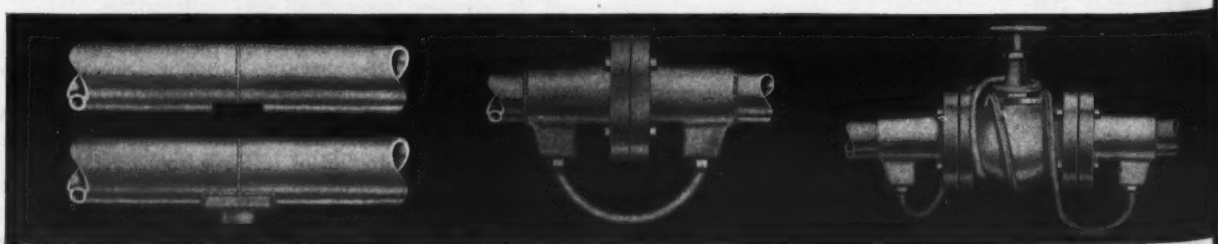
Take advantage, too, of the body of ALCOA literature which describes in technical detail the known performance characteristics of aluminum in a variety of process industries applications. Simply fill in and mail the coupon opposite. ALUMINUM COMPANY OF AMERICA, Alcoa Building, Pittsburgh 19, Pa.

World wide sales through ALCOA INTERNATIONAL, INC., 230 Park Avenue, New York 17, N.Y.

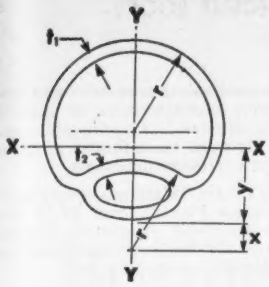


The development of DUOTRACE has opened broad new areas of design exploration in the field of heat transfer. By adding a second trace chamber to the one previously available in UNITRACE, DUOTRACE permits recirculation of the trace fluid. This opens up a whole new area of heat transfer design. Not the least of the possibilities is this: certain types of heat exchangers may now be extruded as single units. The cost savings implicit in such a unit are almost staggering. Alcoa engineers will be happy to assist you in exploring such design innovations in your own plant or process.

Fittings and connections for UNITRACE and DUOTRACE: Unflanged connections can be made easily and effectively with the special UNITRACE Trace Cap. As illustrated, trace chambers in adjoining sections are cut back and a circumferential weld is made to seal the product chamber. The cut back trace section is then covered with a UNITRACE Trace Cap welded in place with 4043 weld wire. Simple, efficient **flanged connections** utilize special UNITRACE flanges designed to accommodate both trace and product chambers. Jumper connections are used to carry the trace across the connection, and special impingement plates in the flange shield the product chamber from erosion as steam passes through the flange. **Valves, pumps and other fittings** can be incorporated into the traced systems by using UNITRACE flanges which mate with all 150-lb ASA flanges, valves and pumps. UNITRACE and DUOTRACE systems accommodate standard preformed pipe insulation.

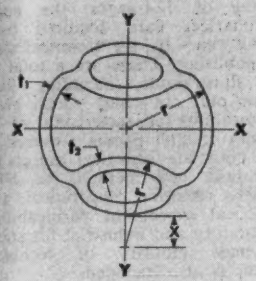


UNFLANGED CONNECTIONS FLANGED CONNECTIONS VALVES AND FITTINGS



	Unitrace Sizes	1 in.	1½ in.	2 in.	3 in.	4 in.	6 in.	8 in.
Axis XX	Moment of Inertia (I) in.⁴	.09	.34	.72	2.71	6.52	31.82	81.82
	Radius of Gyration (R) in.	.37	.58	.72	1.09	1.42	2.12	2.78
	Section Modulus (S) in.³	.13	.34	.56	1.42	2.65	8.73	17.22
Axis YY	Moment of Inertia (I) in.⁴	.09	.33	.70	2.65	6.36	29.72	76.70
	Radius of Gyration (R) in.	.37	.57	.71	1.08	1.40	2.05	2.69
	Section Modulus (S) in.³	.14	.34	.59	1.52	2.83	8.97	17.79

Sizes	1 in.	1½ in.	2 in.	3 in.	4 in.	6 in.	8 in.
r	.657	.950	1.187	1.750	2.250	3.312	4.312
t_1	.133	.145	.154	.170	.187	.280	.322
t_2	.145	.163	.174	.185	.200	.307	.354
x	.133	.344	.406	.625	.813	1.500	2.000
y	.61	.87	1.08	1.59	2.03	2.98	3.87



	Duotrace Sizes	1 in.	1½ in.	2 in.	3 in.	4 in.	6 in.	8 in.
Axis XX	Moment of Inertia (I) in.⁴	—	—	.80	3.06	7.53	—	—
	Radius of Gyration (R) in.	—	—	.74	1.12	1.46	—	—
	Section Modulus (S) in.³	—	—	.68	1.75	3.35	—	—
Axis YY	Moment of Inertia (I) in.⁴	—	—	.67	2.59	6.29	—	—
	Radius of Gyration (R) in.	—	—	.68	1.03	1.33	—	—
	Section Modulus (S) in.³	—	—	.57	1.48	2.80	—	—

Sizes	1 in.	1½ in.	2 in.	3 in.	4 in.	6 in.	8 in.
r	—	—	1.187	1.750	2.250	—	—
t_1	—	—	.154	.170	.187	—	—
t_2	—	—	.174	.185	.200	—	—
x	—	—	.531	.843	1.125	—	—
y	—	—	—	—	—	—	—

Unitrace-Duotrace Sizes	1 in.	1½ in.	2 in.		3 in.		4 in.		6 in.	8 in.
Product Area (in.²)	.64	1.68	2.72	2.36	6.38	5.67	10.84	9.74	24.64	42.79
Trace Area (in.² each)	.10	.16	.35	.22	.98	.61	1.86	1.07	2.85	5.12
Metal Area (in.²)	.65	1.03	1.39	1.46	2.28	2.46	3.24	3.53	7.05	10.60
Weight (lb/ft)	.77	1.22	1.66	1.72	2.71	2.89	3.85	4.16	8.38	12.60
*Min. Bend Radii (in.)	5	8	10½	10½	17	17	24	24	36	48
Wetted Perimeter (in.)										
Product	3.35	4.92	6.31	6.28	9.68	9.65	12.72	13.02	18.63	24.75
Trace (each)	1.49	1.71	2.40	1.87	4.13	3.22	5.32	4.23	6.75	9.63
Fitting Weights (lb)										
Trace-Caps	.102	.126	.240	.13	.464	.40	.674	.55	1.67	2.92
Elbows	.706	1.347	2.111	2.65	5.244	6.59	9.649	11.68	27.76	52.51
Impingement Plates	.024	.039	.057		.101		.162		.22	.34
Stub Ends				.65		1.50		2.13		
Terminal Casting				.50		1.12		1.75		

	1–2 in.	1½–2½ in.	2–3 in.	3–4 in.	4–6 in.	6–8 in.
Adapter Flanges	2.419	3.816	4.774	7.216	11.106	19.23

(Note: UNITRACE values are indicated in clear areas in the table above. DUOTRACE values are shown in the shaded areas.)
*Unitrace may be bent in any direction to these radii provided reasonable tooling is employed.

Aluminum Company of America, 872-J Alcoa Building, Pittsburgh 19, Pa.
Please send me the following literature covering Alcoa Aluminum for tubular products and other uses in the process industries:

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☐ 11453 Solving Refinery Corrosion Problems with Aluminum
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recent books

Fluidization and fluid-particle systems is topic of 513-page volume. Modern developments in fluid-solids processing, including moving-bed techniques and transport reactors are discussed. Written by Messrs F. A. Zenz and D. F. Othmer, Polytechnic Institute of Brooklyn, the book serves as a centralized information source on all major aspects of the subject. Considerable new unpublished material has been included. The book is highly recommended for the practicing engineer interested in the technology.

To obtain "Fluidization and Fluid-Particle Systems" remit $15.00 (trade edition) to Reinhold Publishing Corporation, 430 Park Avenue, New York 22, New York.

Facts about chemicals and allied products industries for the years 1954-58 are covered in 521-page, fifth edition of Chemical Statistics Handbook. Production and sales figures of thousands of chemical commodities, employment and wages, wholesale prices, import-export figures and corporate data are included.

As with previous editions, annual supplements will be published beginning early next year; the first will contain 1959-60 statistics.

To obtain, remit $3.00 to Manufacturing Chemists' Association Incorporated, 1825 Connecticut Ave., N.W., Washington 9, D.C.

Check 4353 opposite last page.

Engineering & Thermodynamics is title of 724-page book written by J. B. Jones and G. A. Hawkins, Purdue University. Intended as textbook in undergraduate engineering courses, book places copious emphasis on points that have been difficult for students to grasp in past. Over 700 problems are included. Answers to about one third of them are in the appendix. Book has 21 chapters. Each ends with summary and lists specific references.

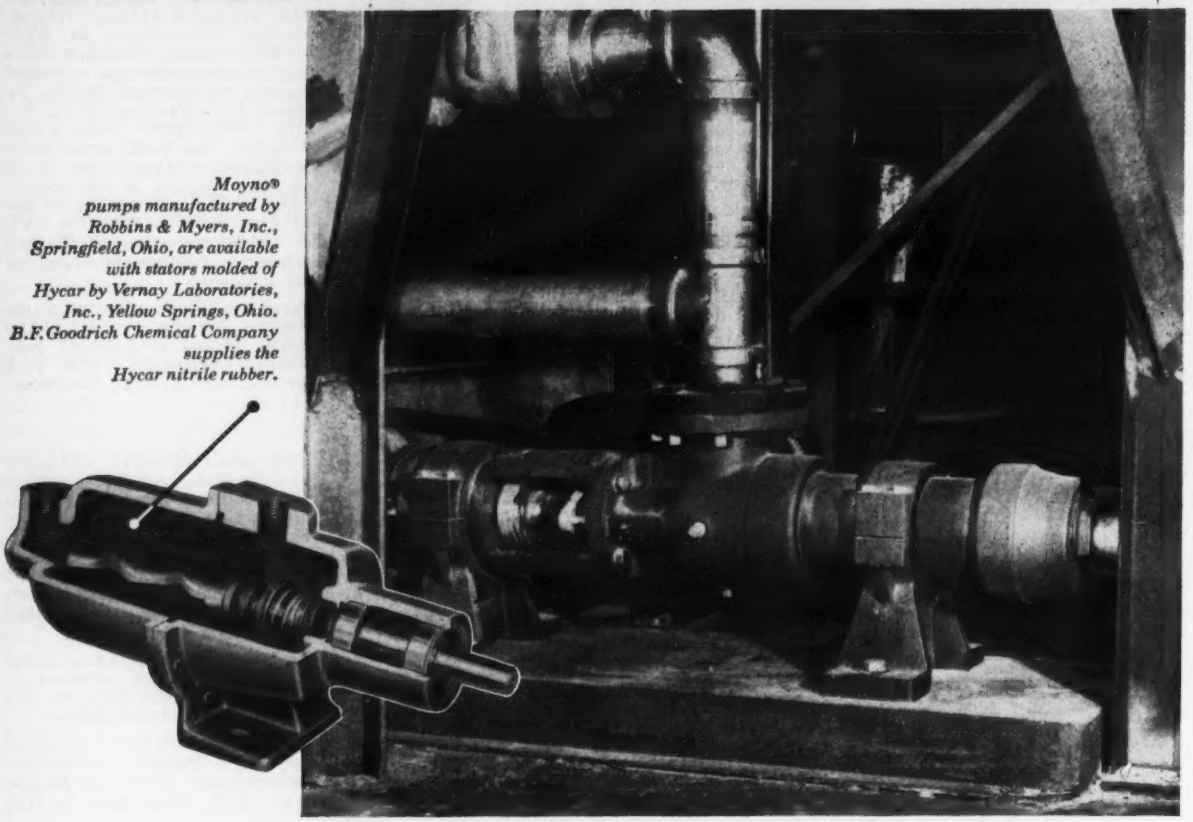
To obtain "Engineering Thermodynamics" remit $8.50 direct to John Wiley & Sons, Inc., 440 4th Ave., New York 16, N. Y.

Check 4354 opposite last page.

Materials selection for process plants consists of 20 chapters designed to help simplify problems encountered by engineering, maintenance and production personnel of process plants. Written by R. E. Gackenbach, American Cyanamid Company, the book's 318-pages are in non-technical language, so that other persons besides engineers can understand it. Book contains valuable data on metals, plastics, rubbers, paints and cements. Corrosion-resisting qualities as well

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Moyno® pumps manufactured by Robbins & Myers, Inc., Springfield, Ohio, are available with stators molded of Hycar by Vernay Laboratories, Inc., Yellow Springs, Ohio. B.F.Goodrich Chemical Company supplies the Hycar nitrile rubber.

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The manufacturer of these pumps says they handle "anything that flows through piping." When the going gets unusually corrosive or abrasive, stators made of Hycar nitrile rubber are used.

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Hycar gives long-term service in an application like this because of its resistance to chemicals and corrosion that would destroy ordinary rubber. Hycar can be accurately molded into the complex double internal helical design of this pump's stator.

Here's another example of the way that Hycar nitrile rubber helps products find new applications, or helps develop new products. For information, write Dept. GO-8, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

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RECENT BOOKS

as mechanical properties and fabricating characteristics of materials are discussed. Considerable space is devoted to cathodic protection and corrosion inhibitors.

To obtain "Materials Selection For Process Plants" remit $8.50 direct to Reinhold Publishing Corporation, 430 Park Avenue, New York 22, N. Y.

Handbook of Filtration is said to be first text devoted exclusively to subject of paper filtration. Consisting of 124-pages, the book summarizes data acquired over many years by the technical staff of publisher. There are a total of 45 illustrations, including five-color pull out chart which gives permeability characteristics of 75 grades of filter papers. Covered in the book are historical aspects of filtration, test method for filter paper, retention, theoretical and practical aspects of permeability, laboratory and industrial filtration. Six-page glossary of technical terms is also included.

To obtain "Handbook of Filtration" remit $2.50 direct to The Eaton-Dikeman Company, Mount Holly Springs, Pa.

Check 4355 opposite last page.

Fundamentals of rocket propulsion is a 135-page book serving as introduction to the field of space propulsion. The first in publisher's Space Technology Series, it is written in an easy-to-read manner, and although directed primarily to technical readers, the book should be of value to all those interested in the field of space exploration.

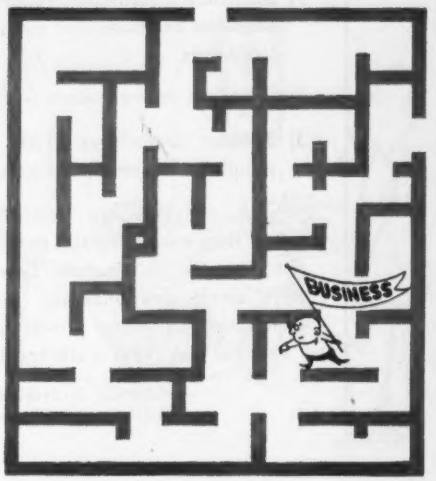
Authors are R. E. Wiech, Jr., and R. F. Strauss, Thiokol Chemical Corp. History of the rocket engine is reviewed in detail. Fundamentals of operation, design of components and methods of applications are also discussed. Different rocket engines are described in detail. Also reviewed are rocket engines of the future, including the ion and photon rockets.

To obtain "Fundamentals of Rocket Propulsion" remit $5.50 direct to Reinhold Publishing Corporation, 430 Park Avenue, New York 22, N. Y.

Catalysis, Volume 7 is last book of series on the subject. Its 378 pages include four chapters on catalytic oxidation, one on hydration-dehydration and one on cracking catalysts. Book is edited by Paul H. Emmett, Johns Hopkins University. Detailed author index is included at end of book. To obtain "Catalysis — Volume 7" remit $13.50 direct to Reinhold Publishing Corp., 430 Park Avenue, New York 22, New York.

Businessmen ARE in politics whether they want to be or not

More and more are realizing that the maze of taxes, inflation and regulation enmeshing industry is political, that free enterprise is in jeopardy, and the choice is to act or submit



By JAY GOSSETT
Assistant Editor

With increasing frequency, American businessmen are crying out that our free enterprise system has been inveigled into a maze where, ostensibly, the most inviting corridors lead inevitably to the minotaur of Socialism.

Interspersed, as they are, in the welter of words printed and spoken daily, these occasional sounds of alarm are quickly diluted and lose their poignancy.

Assemble them and place them in perspective and you have cause for concern.

This maze is the economic, social and governmental climate in which we exist. Its walls are oppressive taxation, unrealistic foreign policies; inadequate depreciation allowances, deficit spending, and the alarming growth of central government which, some say, by its very size will eventually disenfranchise the voter—all the things which sap the vigor of private enterprise.

The only way out of the maze is political action, as these men see it. It isn't a question of jumping or not jumping; it is a question of sinking or swimming.

In a recent speech, David H. Dawson, Du Pont vice-president, summed it up this way:

"The arguments about businessmen in politics really are ones of tactics—to a major extent politics and government are synonymous, and business is controlled by law, and laws are made by government.

"We are in politics whether we like it or not, and the debate is about how, and when, and where."

Thomas S. Nichols, chairman of the board of Olin Mathieson Chemical Corporation, sounded a similar note. Calling for the recruiting of more part-time politicians from the ranks of industry, he said, "We must get ready to sell our beliefs briskly—to persuade others that the politics of happiness lies not in the flabby notion that wise men dodge issues and politics, but in the firm belief of the rightness of conviction, bolstered by the confidence that it's time to get into the scrap."

Pointing out that the ballot gives the political office-holder a power of attorney over our free enterprise system and freedom of economic choice, George M. Humphrey, former Secretary of the Treasury and currently chairman of the board, National Steel Corp., declared:

"The businessman has the right and not only the right but the duty, to use his citizen's responsibilities in our system of government to see to it that the people we elect are people who understand and appreciate our freedoms, who will use the power of attorney, and all the fine print provisions that go with it, to preserve and defend and improve free enterprise.

"The largest items in your cost sheet are fixed for you by political decree, "he warned businessmen. "You must get active in politics if you want to stay active in business."

Possibly the most poignant summarization of the outlook was offered by William C. Stolk, president of American Can Company, to the Chemical Specialty Manufacturers' Association meeting in Chicago.

"We, as businessmen, have been working vigorously and conscientiously to increase productivity, cut costs and provide a firm basis for a constantly improving standard of living.

"But people in increasing numbers are discovering that while we have been busy de-

"You must get active in politics if you want to stay in business."

GEORGE M. HUMPHREY, *chairman*
National Steel Corp.

Businessmen ARE in politics *From preceding page*

WHAT IS LEGAL?

What does all this mean in terms of concrete activities allowable for corporations? While the law here is by no means "settled," competent legal opinion holds that a business association or corporation, among other things, may:

1) Distribute information regarding candidates and their positions on issues and circulate the voting records of legislators.

2) Compare its own views with those of the candidates.

3) Sponsor committees which endeavor to get business people to become more active in politics.

Such activities are considered as permissible even tough they might literally entail an "expenditure" in connection with an election. Lawyers warn, however, that any "direct electioneering" company contribution to a candidate or party or provision of direct assistance along "Vote for Joe" lines is still forbidden.

—HORACE E. SHELDON, Harvard Business Review, March-April 1959, page 42

veloping, financing, producing and marketing new products and services, powerful forces have been working at least as diligently to develop, finance, produce and market ideas that are seriously undermining our political and economic system.

"Standards are being lowered, ideals are being downgraded, character is being weakened, and our constitution—in effect—being rewritten.

"The freedoms now becoming popular are: Freedom from Care; Freedom from Effort; Freedom from Responsibility; and Freedom to Get Without Having to Give.

"You and I, and other businessmen—as individuals—must in order to be good leaders and good citizens, become politically sophisticated. We MUST, as individuals, personally participate in the job of helping to select, nominate and elect able people to public office.

"In conclusion," he warned, "If we fail to do so, we can look forward with certainty to the day when the corporation will become obsolete and the government will become absolute."

Business Can't Get Ear of Congress

Businessmen who have taken their case to Congress have been rebuffed. Some have been told flatly that congressmen couldn't help them because they didn't command any votes.

They've been forced to recognize that an increasing number of politicians feel they must be pro-labor to survive. They've witnessed the decline in the number of conservative-voting congressmen—from 104 members in the 83rd Congress to 19 in the 85th Congress.

Many are convinced that the dominant political force in the nation today is labor.

The inevitable conclusion is, as expressed by Mr. Humphrey among others, "to see to it that the people we elect are people who understand and appreciate our freedoms, who will use the power of attorney . . . to preserve and defend and improve free enterprise."

Old Corrupt Practices Act Restricts Action

But once this conclusion is reached, businessmen find their recourse to political activity is proscribed by a 53-year-old law, enacted in reaction to the political excesses of the, today, happily extinct "Robber Baron" school of business.

This law, known as the Federal Corrupt Practices Act, applies equally to corporations and labor organizations, the latter being included through the Taft-Hartley Act in 1947.

Of primary concern to businessmen venturing into politics are Sections 610 and 611 of Title 18 of the United States Code.

Section 610 forbids any corporation or labor organization to make a contribution or expenditure in connection with any election for federal office. This prohibition also includes contributions or expenditures in connection with primary elections, political conventions, or caucuses held to select candidates.

Section 611 applies to firms or individuals contracting with the federal government. This bars contributions to any political party, committee, or state or federal candidates for public office in both primary and general elections.

Taken literally, this would seem to disallow such corporate political expenditures as evaluating candidates in house organs, sponsoring campaigns to encourage employe contributions to political parties, and even "Get-out-the-vote" campaigns.

Aggressive Labor Won Liberal Interpretation of Act

Ironically, the more liberal interpretation which does condone these activities was won by labor unions whom, the history of the law confirms, have much more aggressively challenged it. In fact, the courts have, in effect, upheld the rights of unions to endorse political candidates.

In two cases, one involving the CIO in 1948 and the other the UAW in 1957, the United States Supreme Court established the pattern of interpretation under which corporations and unions can function.

The government instituted action against the CIO after Philip Murray, then president, sought support for a congressional candidate in Maryland, through the CIO News.

An interesting sidelight of this and the UAW case is that the question of constitutionality of the act was broached but avoided by the Supreme Court.

A federal district court threw the CIO case out on the grounds that the law conflicted with the right of free speech and free press.

The government carried the case to the Supreme Court which ruled that the particular action involved was not prohibited by the statute. The majority opinion contained this comment:

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"If we fail (to participate in politics) . . . the corporation will become obsolete and the government . . . absolute."

WILLIAM C. STOLK, *president*
American Can Company

"We are in politics whether we like it or not, and the debate is how, and when, and where."

DAVID H. DAWSON, *vice president*
E.I. du Pont de Nemours & Company, Inc.

how does your company treat callers?...

'VALUED FRIENDS or SUSPECTED ENEMIES'?

These practices can distort your corporate image . . .

- **Needless quizzing of phone callers**
- **Unnecessary delays in seeing visitors**
- **Brusque reception and treatment of guests**
- **Shabby, uncomfortable reception rooms**



By **GORDON WEYERMULLER,** Associate Editor

In my travels as an editor I have had many heart-warming experiences and have generally been treated with genuine graciousness. Even on other occasions a reception less than the best has not been due to any intent but rather to lack of attention to personal public relations. These latter experiences, along with those of others traveling extensively, provide convincing evidence of the need for improved personal public relations.

Telephone for employees only: During a recent visit to a large company in the Midwest, two visitors asked the receptionist about using the telephone to check on their next appointment. They were curtly told that the telephone in the lobby was for employee use only and that they could not use it. Up to that point, their visit at this company had been a very pleasant one. However, they were somewhat disillusioned as they proceeded to a service station to make their telephone call.

No visitors in the morning: At the office of a multi-plant company in the East, a visitor arrived for his appointment at 10:30 AM and was greeted by a huge sign saying that no visitors would be received during the morning hours.



"If you will please forward complete biographical information and a copy of your birth certificate, I'll see if you can speak to Mr. Blotz."

Even though his appointment had been confirmed, he proceeded to the office of the person he was to see with fear and trembling, considering the possibility of being tossed out.

Unnecessary waiting: On another occasion, a visitor from a chemical company arrived for his appointment, which had been confirmed by letter. After half-an-hour wait past the designated time, a girl popped out from a doorway and told him the person he was to see, Mr. X, had arrived late and now had several things to take care of before he could see him. The visitor told her that he had another appointment and that if he couldn't see Mr. X right away, he'd have to leave. At that point the visitor obtained quick action but his firm stand shouldn't have been necessary.

The companies in the foregoing examples are all large ones and spend a great deal of money for public acceptance of their products and company. Most of the things that give them a black eye from the personal public relations standpoint can be easily corrected without spending much money. It would pay you management men to check public relations practices at your offices and plants.

Shabby entrance, poorly marked: On a chemical plant visit, an engineer arrived at the plant site to find that no clear directions were in evidence as to how to reach the main entrance. After wandering around in the rain for ten minutes or so, he finally did reach the main entrance and found it to be a rather shabby place. The waiting room was small, poorly furnished, and looked like it hadn't been painted in about ten years. In his visit at this plant he was told that chemical engineers were desperately needed. Were he a prospective employee, he would have been unfavorably inclined as soon as he entered the plant.

Padlock on telephone: On a visit another man made to a company in California, he

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CHEMICAL BUSINESS

Managers, take a look at your plants. Are they . . .

Attractive and Appealing or Dull and Drab?

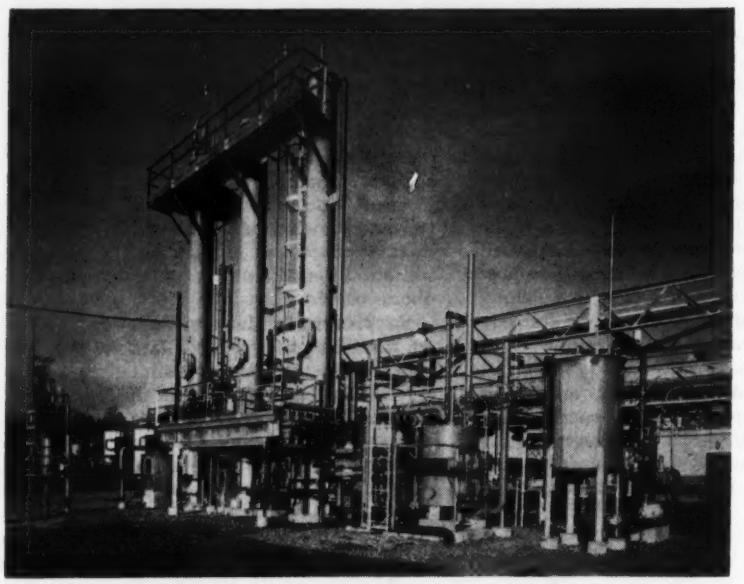
Air Reduction's streamlined plants at Calvert City, painted in bright colors, strengthens position of those who say that beautification:

- **Boosts employee morale**
- **Cuts maintenance**
- **Improves safety**
- **Promotes company image**

GORDON WEYERMULLER
Associate Editor



Coatings are colorful, yet resist corrosives. These units filter process water coming from Tennessee River. Tanks and lines carrying water are blue. Other lines are color-coded according to material handled



Acetylene purification unit for vinyl chloride monomer plant. Equipment and lines are coated in pastel colors, purple designating caustic; green, chlorine water; blue, water; and orange, acetylene

Is it too costly to make a chemical plant attractive, to allow ample space between individual processing units, to paint it with brightly colored protective coatings? Air Reduction Chemical doesn't think so, as shown by the new plants at Calvert City, Ky., for producing polyvinyl chloride and polyvinyl alcohol. Plants are streamlined in design, and pastel colors have been used for painting many pieces of equipment.

Airco's main office at Calvert City creates a favorable impression on visitors. Building is attractive and it is landscaped to advantage. A tile wall constructed in checkerboard style with open space between tiles is effective in enhancing appearance of entrance to office.

Air Reduction believes that the additional cost of making a plant attractive, if it does cost more, is far outweighed by the advantages obtained. One of the main benefits pointed out by company management is that plant beautification encourages employees to have the right job attitude. With this attitude, plant is operated and maintained better. It's like the pride one takes in a new car.

Company has found that color coding of various process lines speeds up recognition of streams and helps train employees. It also calls attention to spills and leaks. Management feels that the appearance of the plants means much in portraying the image of a progressive company.

Neighboring General Aniline plant has equipment painted in bright colors. Management at this plant has feeling that this makes employees respect the equipment and therefore treat it better.

Esso at Linden, N. J., believes that the colorful coatings used on plant there boost employee morale, resulting in improved housekeeping and better maintenance.

Some Plants Feel Colors Cost Too Much

The subject of painting plants in bright colors is a controversial one. Main objection to those opposed is that colors cost too much. Whereas a good protective coating may last several years, with colored coatings plant must repaint every two years or less to maintain attractive appearance.

Leaks and spills can discolor the brightly colored coatings and make them unsightly. Du Pont solved this problem at its isocyanate plant in Deepwater, N. J., by painting the equip-

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Polyisoprene-polybutadiene plants to date

Company	Plant Location	Capacity Long tons/yr	Start-up Date
Shell Chemical Corporation	Torrance, Calif.	20,000*	1960
Phillips Chemical Company	Borger, Texas	25,000**	1960
Firestone Tire & Rubber Company	Orange, Texas	30,000	1961
Goodyear Tire & Rubber Company	Beaumont, Texas	(Not released)	1961
Shell Chemical Corporation	Midwest	40,000*	1961
American Rubber & Chemical Company	Louisville, Ky.	30,000	1961

* Only polyisoprene scheduled to date.
**Only polybutadiene scheduled to date.

As announcements come with increasing frequency of large-size commercial plants to produce the stereo-specific synthetic rubbers, it is evident that the U.S. is in the midst of a boom on these products that promises to boost capacity to 200,000 long tons/yr by late 1961

Polyisoprene, polybutadiene pace quickens as new entries push plans

HERMAN R. THIES
General Manager, Chemical Division
The Goodyear Tire & Rubber Company

ONE of the most significant and exciting developments in the entire chemical processing field is the rapid commercialization of polyisoprene and polybutadiene synthetic rubbers in the U. S. This follows a few short years of concentrated research and development, with associated speculation as to when the big swing might get under way.

It seems distinctly possible now that we may be able to produce a polymer that is at least equal to natural rubber in every respect and that can sell for the same price. This would make the U. S. completely independent of natural rubber. At present about two-thirds of U. S. rubber consumption is synthetic, the other third coming from natural rubber grown abroad.

Now, the rubber industry has increased understanding of the complex chemistry of rubber and will operate less and less on an empirical basis. This means that rubber companies will move more and more into the domain of chemicals and plastics.

Several U. S. Companies Now in Field

Announcements from three companies — Goodyear, Shell and American Rubber — within a period of a little over a month of plans for plants, is an indication of the growing rush toward large-volume production of polybutadiene and polyisoprene. Goodyear will build a plant for both types of synthetic rubber at Beaumont, Texas. Capacity was not released.

Shell announced plans for a second polyisoprene plant, to be located in the Midwest, with a capacity of 40,000 long tons/yr. Company is presently building a 20,000 ton polyisoprene plant at Torrance, California.

The third recent announcement is of the formation of a new company — American Rubber & Chemical Company — to produce polybutadiene and polyisoprene. American Rubber is jointly owned by Stauffer Chemical Company and American Synthetic Rubber Company. A plant will be built at Louisville, Ky. with a capacity of 30,000 long tons/yr. With minor modifications, production can be increased to 50,000 long tons/yr.

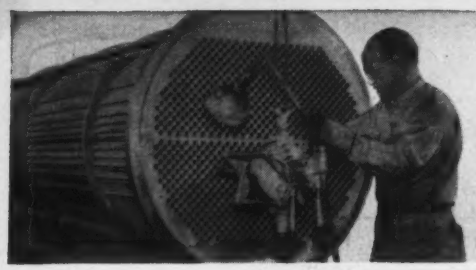
Firestone and Phillips previously had made announcements of commercial plants. Firestone will produce both types while Phillips will concentrate on polybutadiene.



HERMAN R. THIES has made many valuable contributions to rubber chemistry. He has been assigned a number of patents and is the author of scientific publications. Having previously worked in research, plastics and coatings, Mr. Thies became manager of Goodyear's Chemical Division when it was organized in 1948. He graduated from Phillips University; received an MS in Chemistry from University of Chicago.

Waiting in the wings with announcements of plants for polybutadiene, polyisoprene or both, expected momentarily, are Goodrich-Gulf, U.S. Rubber, General Tire & Rubber, Texas-U.S. Chemical, and Copolymer Rubber & Chemical Corporation.

With plants already an-



CONDENSER AND HEAT EXCHANGER CLINIC

Edited by Arthur W. Tracy, Metallurgical Engineer
The American Brass Company, Waterbury, Conn.

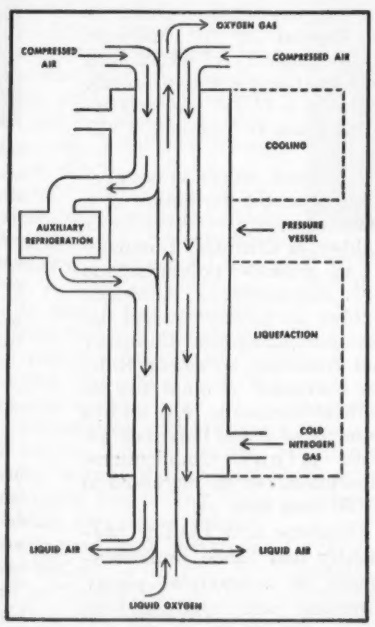
Cryogenic heat exchanger uses 16 miles of copper tube



A copper-tube heat exchanger used in the production of oxygen and nitrogen in a large low-temperature processing plant made by AIR PRODUCTS, INC., Allentown, Pa. The ⅜" tubes are wound tightly and built up layer by layer for greatest possible surface contact — and maximum heat transfer between the oxygen and air tube systems (see diagram below). AIR PRODUCTS winds bundles from long lengths of Anaconda tube. A total of 85,200 feet is used in this exchanger, for a total weight of 14,500 pounds. The "button-hook" manifolds for the tube systems are of Red Brass pipe, with extra-heavy or double-extra-heavy wall.

In applied cryogenics — the use of low-temperature techniques for gas liquefaction and separation and for the handling and application of these gases — the unique properties of copper and copper alloys become particularly important. The high thermal conductivity of copper — the highest of any commercial metal — is essential for economical heat transfer in large volumes of fluids. Outstanding corrosion resistance is important. And finally, copper has no tendency to brittleness at very low temperatures, and the strength of copper and copper alloys is significantly higher at —300F than at room temperature.

The use of low-temperature processing and of liquefied gases is rapidly increasing in the chemical industry, in basic metals industries, and in space and missile fields. And new applications are being found constantly. American Brass Company specialists are available to help select the alloy best suited to your job. For more information on tubes for heat transfer, or for technical assistance, write: The American Brass Co., Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario. 6068



Schematic diagram of heat exchanger used in the production of oxygen and nitrogen. Incoming air under pressure passes through a set of coils in the exchanger and is cooled by counter current heat exchange by cold outgoing oxygen and nitrogen. Oxygen from the distillation column enters the heat exchanger as a liquid under pressure and, in removing heat from the air, vaporizes to a gaseous form and leaves the heat exchanger at near entering air temperature. Part way through the heat exchanger, the air is removed from the heat exchanger and sent through a Freon cooling system for auxiliary refrigeration and then returned to the exchanger for final cooling.

ANACONDA®
TUBES and PLATES for CONDENSERS & HEAT EXCHANGERS
Made by
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Check 4244 opposite last page.

nounced, U.S. capacity for polybutadiene and polyisoprene will be close to 200,000 long tons/yr by late 1961.

Competition from Abroad Looms in Future

Professors Ziegler and Natta have developed another type of stereo-specific synthetic rubber based on the ethylene-propylene copolymers. Such copolymers are particularly attractive since they are based on 4-5¢/lb monomers.

Montecatini has announced semi-commercial production of ethylene-propylene copolymers at Ferrara, Italy. Although this is a source of concern to U. S. companies, they undoubtedly have some plans of their own along this line.

Russia has announced the development of a polyisoprene rubber known as SKI.

Polyisoprene Completely Replaces Natural Rubber

Physical structure and properties of polyisoprene are extremely close to those of the tree-grown product.

In tree-grown rubber there are appreciable amounts of natural non-rubber components such as anti-oxidants, proteins and fatty acids which are absent from the synthetic. These deficiencies can be made up by additives which help to stabilize the polymer and cause it to behave in processing and curing more nearly like tree-grown rubber. Polyisoprene rubbers process well, are easily compounded and we expect them to invade and be of serious contention in all fields now dominated by the natural product.

In actual road tests, polyisoprene tires have exhibited better tread crack resistance than natural rubber. Tread wear also has been quite close to that of natural.

Other tests with high-speed jet aircraft tires capable of withstanding landing speeds up to 250 miles per hour have qualified polyisoprene rubber for jet aircraft service. Such tires have successfully withstood temperatures in excess of 250°F, which correspond to

To page 88



Are You Ready to Meet the Computer-Control Challenge

Computers are ready for the chemical industry, but the industry is not completely ready for them. The processes now being controlled by closed-loop systems are notable exceptions, rather than the rule. But make no mistake about it, the wave of the future is with such setups. There are few plants producing in volume that will not have to deal with computer control in the coming decade — if not on the complete process, then certainly on segments thereof.

Sooner or later, the practitioners of the science of process dynamics will evolve for most processes mathematical models understandable to computers. These people will become greater in number and importance in the years ahead. Management should therefore start now to know the process-computer man better.

As this trend to closed-loop control becomes increasingly apparent, more and more engineers will want to become adept in the art of process computers. They will rightfully expect management to take the lead in encouraging education in this area.

Even with a computer and a precise mathematical model of the process in hand, there is still many a slip between the integral and the smooth-running closed loop. Sound management thinking and top-flight engineering know-how are prerequisites in the successful computer-controlling of any process. Some advance planning along these lines can reap great rewards later.

Process instrumentation is one area where such advance planning can pay off handsomely. The success or failure of an on-line control system hinges heavily on an accurate process — behavior profile.

The data-handling/computing and process-control elements of the loop are only as good as the information supplied them by process measurement. Unlike a human, the computer cannot insert the time-honored "fudge factor" in translating instrumentation gathered data into process-controller adjustments. Keeping this in mind when looking over future instrumentation acquisitions can save heartbreak later.

Several aspects of these problems are considered in this 6th Annual Process & Laboratory Instrumentation Feature. Also reviewed in the 32-page section are the latest instrumentation products, new literature and installations in the field. Some highlights are listed below:

Instrumentation Feature Highlights

Today's Computer Specialist—A Profile

CP survey probes training and experience, points way to better understanding him 35

3 Steps to Success in Computer Control

Linking computers to instruments . . . closing the loop . . . evaluating operation 38

What's Holding Back Stream Analysis?

'Crash programs' can spell disaster in continuous on-stream analysis 44

Optimum Routes to Instrument Safety

Explosion-proofing, purging and intrinsically safe-design possibilities 93



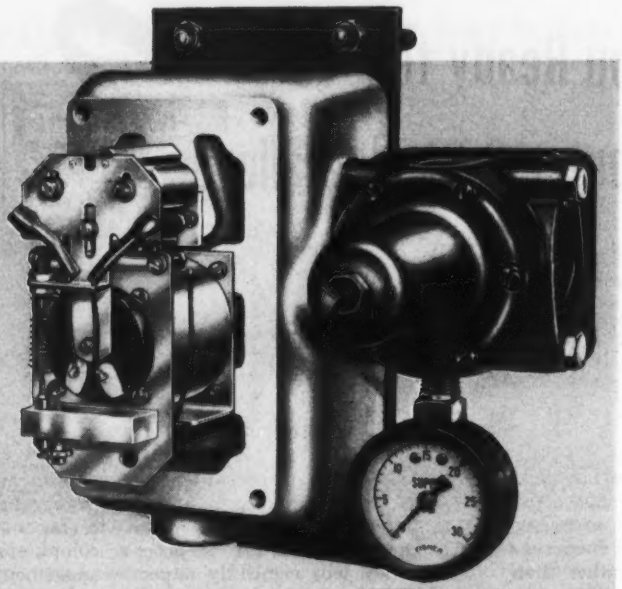
Ask Your *FISHER/MAN* How To

SPEED THE INPUT SIGNAL to the CONTROL VALVE

FISHER

TYPE 543

ELECTRO PNEUMATIC TRANSDUCER



Available with or without a pneumatic valve positioner

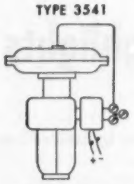
Here's an electro-pneumatic transducer developed for use in electrical control loops where the final control element is pneumatically operated. Explosion proof design makes it ideal for use under hazardous conditions. Input signals may range from 1 to 5 ma. through 10 to 50 ma.... output from 3 to 15 psi through 6 to 30 psi. Built-in volume relay permits direct operation of the pneumatic actuator from the Transducer. No extra relays or boosters needed. Relay can be serviced independent of electrical assembly. Unit is completely reversible by reversing input leads and rezeroing.

If you want additional information on the Type 543 Electro-Pneumatic Transducer write Fisher Governor Company.

TYPICAL CIRCUITS		
Input Current	Load Requirements of Controller	Actual Internal Resistance of Transducer
1 to 5 ma dc	3,000 ohms maximum	2,500 ohms ±125 ohms
1 to 5 ma dc	12,000 ohms ± .5%	12,000 ohms ± 50 ohms
10 to 50 ma dc	500 ohms maximum	57 ohms ± 4 ohms

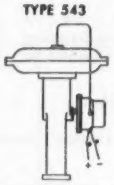
PERFORMANCE DATA	
Linearity	1% of full range
Air Consumption Rate	2 SCFH with 15 psi output pressure
Resolution Sensitivity	.05% of input range
Frequency Response	Complete frequency response data with Fisher topworks available

TYPE 3541



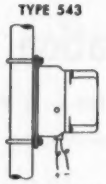
Electro Pneumatic Controller Mounted on Control Valve

TYPE 543



Transducer Mounted on Control Valve

TYPE 543



Transducer Mounted on Stand Pipe



IF IT FLOWS THROUGH PIPE ANYWHERE IN THE WORLD... CHANCES ARE IT'S CONTROLLED BY...

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CONTINENTAL EQUIPMENT CO. DIVISION, Coraopolis, Pennsylvania

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SINCE 1880

Check 4245 opposite last page.



Do you talk 'computerese'?

Are you man or mouse when conversations turn to computers? Does the teen-age mathematical genius in your family like to test your parental sanity by rattling off such free-wheeling terms as binary coded decimal, mnemonic code, binary digit, binary scale and radix?

Do you suspect that such simple English words as address, drum, gate, bit and



patch mean more than they used to? If so, then a recently published pocket-size 22-page glossary of computer language should be just the thing for you.

The booklet defines some 82 terms (in a serious manner) which the instrument producer's own engineers have helped to create in building industrial process computers. Typical of the concise, clear definitions: a table of binary-number equivalents for the decimal numbers 0 through 10. The publication should prove to be quite popular among those engineers born in the "pre-automation" era.

(Copies of "Do You Talk 'Computerese'?" are available from Industrial Division, Minneapolis-Honeywell Regulator Company, Philadelphia 44, Pa.)

Check 4246 opp. last page.



what you should know about the people who run your

process computers

CODE:

Clear and shaded areas in chart bars show how "computer men" replying to recent CP survey fitted themselves for their work:

Distribution chart of experience and training background of people who run today's process computers shows peaked emphasis on calculational work. Dynamics (top) has received less attention, as have system optimization and design, analog computer operation, and actual closed loop control. Within three to five years, this order will be reversed.

- Experience
- Training
- Both
- Undifferentiated

What Kind of Men Run Process Computers?

. . . chances are that you'll be expected to

THE process computer people in your environs are important to get to know and understand. More and more, they'll be evolving new techniques which as applied will change many old ways of doing things in your organization.

At the minimum, it will be well to develop friendly awareness of their attitudes and activities. Some readers will not stop at this—they will learn to work at least occasionally with these people, bringing their specialized background into harmony with new approaches of mathematicians, statisticians.

Can one actually do these things? The answer is, "yes" —it's still quite easy for the time being. The field is so new that admission qualifications to the groups are not formalized. Eckman (*1*) says, "Computer control systems engineering requires the coordinated effort of a variety of specialists in processing dynamics, control, systems economics, and computers." The field is open, but only the bright and hard working need apply (see opposite page).

Hazen, of MIT, puts it this way (*2*): " . . . increasingly the engineer must be prepared to communicate knowledgably and to work with his mathematical colleagues in order to understand new areas of mathematical endeavor (which) have become important in engineering. To do this, he must have at least some appreciation of the character of mathematical thought . . ."

One can no longer afford to take lightly the personal impact of the rapidly advancing pace of developments.

One large chemical company now expects its technical supervisors to, wherever feasible, interject into discussions with group members such questions as: "Have you considered trying this out on the analog computer?" — even though it is known that the person involved has not as yet gotten near the device. Purpose: To develop awareness that soon these new techniques will be standard procedure.

"What Kind of Men . . .?"

To find out for its readers what makeup of people are running today's process computers, CP went to heads of process computer groups in most leading chemical companies, petroleum refiners, and design-engineering firms known to be engaged in not only calculational (problem solving) but also experimental (plant and equipment dynamics measurement) and optimizational (systems engineering) activities.

Leaders were given supplies of questionnaires, asked to distribute copies to teammates, for individuals to return.

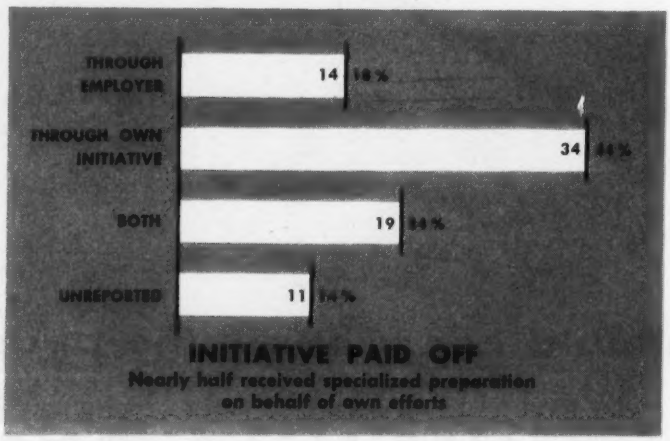
Questions were: What is your training and experience? Was this obtained on own initiative or through program offered through employer? What recommendations do you have as to how chemical engineers might undertake self-preparation to qualify for related roles?

Respondents . . . all from industry . . . totaled 78.

"Formal Training" table (facing page) shows that most respondents are chemical engineers. Not shown, however, is that some groups are led by engineering science or other degree people.

"Background" replies make interesting distribution pattern (previous page). Clearly indicated is today's individual concentration on "calculational" (center bars). "Experimental" (top bars) and "optimizational" (bottom bars) show far less individual qualification.

Bars, from left to right, show numbers of individuals reporting "experience," "training," "both," and "not separately identified."



Individual benefit is shown by small bar chart on this page. Thirty-four out of the total of 78 got where they are through self-preparation.

Advice as to how to go about preparing one's self is summarized on page opposite. Note emphasis on math. One qualified reviewer, after reading "advice," said, "One shouldn't forget, however, that successful use of these techniques in the field of processing will take place only as we concurrently learn more about the relationships between reaction kinetics and transport processes, etc. . . ."

Industry Must Augment Self-study Program

As to "how," Eckman (*1*) has this to say: " . . . it is primarily the responsibility of the individual engineer to augment his technical ability so as to maintain at least a measure of pace with the rapidly advancing technology.

". . . The individual cannot, (however), operate in an atmosphere of discouragement to self-study, so minimum participation by industry is necessary.

"A program of self-study should complement and not replace industry-sponsored programs.

"Self-study in mathematics is difficult if not largely impossible and the use of local programs will greatly improve rapid attainment of a minimum capability.

"To obtain a measure of competence in (the programming of digital computers) a course such as presented by IBM and others should be taken. Often this can be arranged in conjunction with the computer owned or rented by one's company.

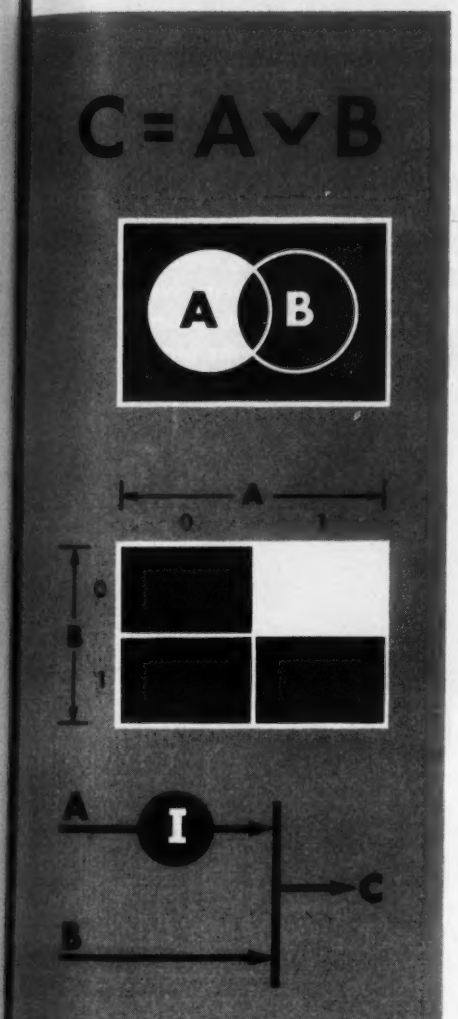
"Self-study beyond the minimum requirements in mathematics and control theory should be accomplished through a regular program . . . A sabbatical for the best talented engineers . . . has the advantage of relatively quick results and thorough training. A leave program at a local institution is longer in term but less in cost . . ."

Literature cited:

1) Eckman, D. P., "Engineering education in computer control," paper 15-H60, ISA 1960 Winter Instrument Automation Conf.

2) Hazen, H. L., "Engineering programs in the light of the new technology," Scientific Manpower 1959, NSF 60-34, U.S. Govt. Prtg. Office, Washington.

work more closely with them in the future



The 'new' math

Computers make new use of old math. In "symbolic logic" example above, variable "C" is said to be "true" if either "A" is false or "B" is true. Circuit planners once used Venn diagrams (circles), now use "truth table" adaptation. Electronic equivalent (below) allows "A" signal passage only when "false."

Preparing Yourself for A Future of Computer Work?

It will pay you to heed these words of advice from men experienced in the field

". . . model building is little more than a highly systematic setting down of specific process know-how . . ."

". . . should study and practice: 1) basic analog simulation — to demonstrate that problems can and should be analyzed dynamically . . . 2) applied analog simulation — to learn what is better by trying everything which is worse . . . 3) automatic control theory, transfer functions, etc. *if so inclined* — can only be absorbed if one has developed a burning desire to more deeply understand those phenomena encountered in practical analog simulation . . . 4) digital computation — will aid in programming . . ."

". . . not all should try . . . Only those who have a strong knack for math and analysis, plus lab or field experience (as opposed to purely paper work in design, etc.) sufficient to inspire a good insight into the way equipment and processes actually work, and strong distrust of the way other people say they work . . . the *analytical point of view* that will get an individual through basic math is much more important than mastery of the (calculational) techniques . . . I'm convinced of the desirability of a broad knowledge of physics and physical chemistry . . ."

". . . concentrate on analysis of differential equation 'thought problems' . . . accumulate a thorough mathematical background as applied to unit ops, both steady and unsteady state, but emphasizing analysis rather than equation solution . . . Take courses based on texts, 'Process Dynamics' by D. P. Campbell or 'Automatic Process Control' by D. P. Eckman . . . also on application of computers to problem solution . . ."

". . . Begin by surveying the last five years of back issues of periodicals (which contain papers and reports on control systems engineering and theory, computer use, etc.)

". . . best way to learn how to use a digital computer is to use it . . ."

". . . take (advanced) courses in (math), process control theory, fundamental statistics . . . Learn to program both analog and digital computers to become aware of their capabilities and limitations for various types of problems . . . Gain process and economic experience in industry to learn which practical problems generally cannot be adequately expressed mathematically . . . Work closely with PhD level mathematicians and especially statisticians . . . Have that certain something in your nature which truly enjoys problems—(including) algebraic 'word problems' . . ."

". . . Get solid background in the fundamentals of chemical engineering . . . firm knowledge of applied math and control theory . . . ability to use both analog and digital computers . . . analysis of large-scale complex systems using circuit theory and topology of linear graphs — this being a most important area of chemical processing technique with the least amount of directly applicable theory and background . . ."

". . . Field is changing so rapidly, best training is probably obtained by experience with an established group . . ."

". . . Get broad training in chemical engineering, then experience in an operating plant . . . Theory is the essential foundation but is wasted in absence of an understanding of existing plant installations plus a feel for what is possible . . . Proper guidance in industry should aid the essential need to adapt theoretical knowledge to completion of projects which will have economic significance . . . Abstract theory may have an important place in space and defense, but don't look for blue-sky projects in the chemical processing industries . . ."

". . . Continuous study and hard work . . ."

". . . Don't wait for complete training . . . Tackle problems as soon as possible, as you'll learn much by doing . . ."

". . . Concentrate mostly on applied math, as this is the foundation . . . "

". . . Forget that the old methods were the only way of solving problems . . . look to the new techniques . . ." ■

FORMAL TRAINING

(highest degrees)

ChE—BS	19	
ChE—MS	17	
ChE—PhD	14	
ChE—BS plus Math—MS	1	
ChE—BS plus Indus Mgmt—MS	1	
ChE—BS plus Chem—BS	1	
ChE—BS plus Chem—MS	1	
ChE—MS plus Phys—PhD	1	
ChE—MS plus Math—MA	1	
ChE—MS plus Math—PhD	1	
ChE—PhD plus EE—MS	1	
Total ChE	**58**	**(75%)**
Engrg Science—BS	1	(1+%)
EE—BS	3	
EE—MS	2	
EE—PhD	2	
EE—BS plus Phys—BS	1	
Total EE	**8**	**(10%)**
ME—BS	3	
ME—MS	2	
Total ME	**5**	**(6+%)**
Phys—BS plus Math—Phd	1	
Phys—MS	1	
Total Phys	**2**	**(2+%)**
Math—BS	1	
Math—MA	1	
Total Math	**2**	**(2+%)**
Chemistry—BS	1	(1+%)
Grand Total	**77**	**(100%)**

3 STEPS TO SUCCESSFUL PROCESS COMPUTER CONTROL

Here are problems you'll encounter and sound advice on how to beat them when . . .

1 LINKING TO INSTRUMENTATION

2 CLOSING THE LOOP

3 EVALUATING OPERATION

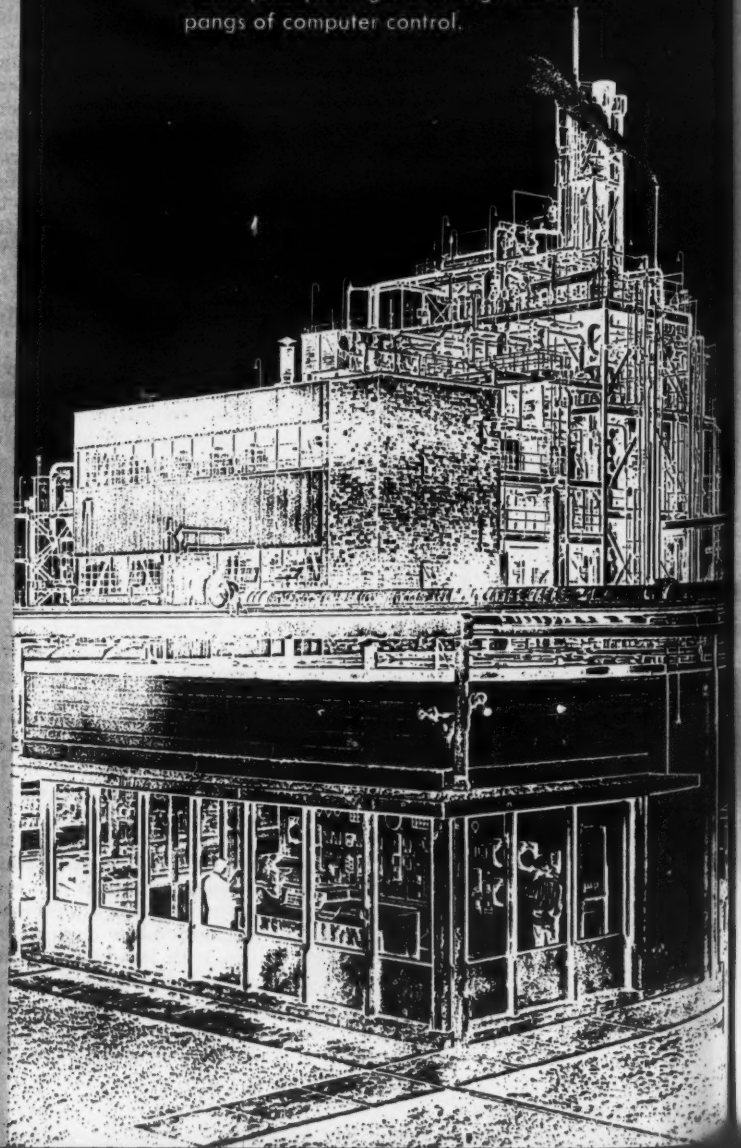
Computer ready

. . . set . . . GO!

Sooner or later in the gestation period of any computer-controlled process, there comes a day when all the process analyses and all the economic justifications have been completed. At this point, there is still a long row to hoe before the process is successfully flowing without human intervention.

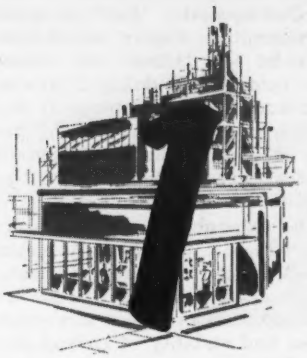
The management and engineering people who take care of day-in and day-out plant operations still have the vital (and tough) job of integrating this new member into the processing family.

Here, three top men in their fields give you some tips to make your job easier when your plant goes through the birth pangs of computer control.



Instrument maker cites need for accurate measurement of process variables in successfully . . .

Linking the process to the digital computer



V. V. TIVY,
Manager, Systems Engineering Division, The Foxboro Company

With the rapid growth of interest in computer control and the resulting general intrigue with the mechanism and workings of the computer itself, there may be a tendency to lose sight of the factors of instrumentation that must also be considered. The computer will remain a completely inanimate device until it is connected to appropriate sources of information and permitted to instigate commands as a result of the proper digestion of information it receives.

Assuming a perfect computer, its contribution to the performance of a plant is dependent upon:

1) Validity of its program and the authenticity of the mathematical equations it will be called upon to solve.
2) Accuracy and reliability of the measurements of conditions in the process.
3) Accuracy and reliability of the analytical measurements of process inputs and outputs.
4) Stability and dynamic capability of the analog controllers, some or all of which may be directed by the computer.

Need for Accurate Measurement

While there is a very general understanding of instrumentation as applied to processes, there has been only a rather casual attention to accuracy of measurement. In the control system of many process plants, constancy of measurement is considered to be much more important than specific accuracy. Adjustments of controlled values are normally made on a relative basis rather than with respect to an absolute value.

It might be said that the human operator directs his plant on the basis of a series of regression analyses using the plant itself as its own model. This approach can be used in computer control but use of the theoretically rigorous mathematical model is becoming more common. Consequently, there will be an increasing demand for precision in measurement.

Instruments of appropriate capability are available. It becomes necessary only to decide that accurate measurement equipment be used and good practices followed.

Material Balance Important

A useful exercise for the would-be computer user is to make a material balance around his plant using figures taken from his instruments. It is not uncommon to find errors of 10 percent or more in the balance. This clearly is unsatisfactory where one is looking for a computer payout based perhaps on an improvement in yield of, say, one or two percent. Sometimes the quantity measurements total something other than 100% because relative rather than mass flow measurements are made.

This difficulty can be resolved in one of three ways. A mass flow meter may be the answer. Alternatively a local, perhaps analog, computation will convert the simple signal to one giving mass flow. Finally, the computation may be performed in the digital computer. Choice of method will be dictated by availability of equipment, need for continuous measurement and control of mass flow, and expense. One general solution to all cases seems unlikely.

Temperatures and Pressures: Small Errors Become Significant

Similarly, while measurement of temperature with a thermocouple is routine, it does not follow that the temperature at the thermocouple is representative of the temperature within the process. Thermocouple-well conduction errors are often substantial. Also, with pressure measurements, zero shifts are sometimes introduced by liquid heads in gage lines. Errors such as these are of small significance when relative evaluations are used. When absolute measurements are required, however, they cannot be tolerated nor are they necessary.

The first step, therefore, in applying a computer to a process is to review the process measurements and arrange for their overall accuracy to be consistent with the demands of the system.

With measurements of satisfactory accuracy, it is then necessary to be sure that the translation into computer language is properly effected. Most of the signals will be analog in nature. They may be either pneumatic or electronic. Transmitters that are used in analog control loops are usually designed within rather specific dynamic boundaries tuned to the type of process to be regulated. The dynamic requirements for an analog controller are not necessarily compatible with those of a time-shared digital computer.

Process noise, instrument noise and transmission noise, all of which are now recognized and compensated for, should be reexamined when measurements are to be multiplexed. Additionally, precautions must be taken to assure that the act of sampling does not of itself introduce spurious transients that might be detrimental to control.

Process Stream Analyzers Pose Application Problems

Analyzers are, themselves, a major factor in the application of computers. The use of "on-line" analytical measurements in the process industries is only now becoming general. Installation and maintenance pracices are not as fully developed as in other branches of instrumentation. The need for greater application of stream analyzers is obvious. (*Problems involved in sampling and analyses of process streams are discussed separately on page 44.*)

Consider Operator and Dynamics In Joining Computer, Controllers

Having provided the computer with satisfactory measurements and programmed it properly, it remains only to join it to the controllers it will direct. While at first this may seem a simple enough task, there is need for careful consideration before ar-

riving at a decision as to implementation.

The most important consideration is that of "human engineering" of the system. The set point of a controller is the steering wheel with which the operator directs his process. Consequently, "feel" is important. Proper information display is essential. He must not be left "blind" nor wondering what the computer is doing. Provision for manual override must be properly thought out and retention of control during possible computer shut-down must be inherent.

Dynamics must be considered in joining the computer to the controller. First of all, it must be remembered that the maximum speed at which a process will respond is determined by its own time constant. This intelligence must, therefore, be built into the system. Then most processes are extremely non-linear and stability of control must be planned. For example, a particular control system may be adequately served by a simple three-term controller when directed by human operator. Same application may require an adaptive controller where computer direction is anticipated.



MR. TIVY is a graduate of the Royal Naval College, Dartmouth, England, and spent a short time in the Royal Navy before entering the field of instrumentation.

From George Kent, Ltd., in England, he moved to Trinidad and Venezuela, working in the petroleum industry. Following an association with the M. W. Kellogg Company, he joined the sales engineering staff of The Foxboro Company.

After a number of years as Manager of Sales to the Petroleum Industry, Mr. Tivy was appointed Chief Application Engineer. He is currently Manager of the Systems Engineering Division.

Mr. Tivy is a member of the ASME and the ISA.

There are various forms of adaptive controllers. It may be satisfactory to let the computer "adapt" the controller to the process by modifying its gain and time constants as a function of some outside parameter. Another technique would be for the controller to adapt itself to the circumstance in the light of its own intelligence.

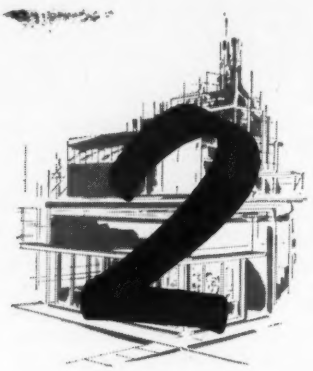
In summary, it might be said that the addition of computer control to a process does not introduce new problems of instrumentation. Rather, understanding the limitations of an electronic brain compared with capabilities of the human brain suggests the need for a much more critical examination of the known factors of instrumentation.

It has been said that the big pay-off for a feasibility study has been found in the improvements that were effected in the established systems of instrumentation — so much so that sufficiently great process performance improvements were achieved that the application of the computer was no longer felt worthwhile. Such a conclusion is, of course, to be regretted. By combining good instrumentation with properly applied computer techniques there is every expectation that even greater profits can be squeezed out of our processes either by improving the process as it exists today or by making possible the design of a more efficient processing plant tomorrow. ∎

Computer builder analyzes problems in coordinating process, operator and computer functions to achieve . . .

Closed loop operation

WILLIAM S. AIKEN,
Director of Engineering, The Thompson-Ramo-Wooldridge Products Company



Since it is standard practice in the check-out of closed loop computer process control systems to operate first in an openloop, operator tracking mode, the experience of these checkouts has provided an interesting comparison between open-and-closed loop operations. This has thrown light on the problems involved and the advantages obtained in "closing the loop".

Benefits in connecting control computer outputs directly to process set points parallel those obtained for automatic controller.

A little experience on the part of an operator, after tracking computer outputs every 20 minutes, can quickly be changed from a mildly interested observer to a convert. ("Come on let's close these loops.")

Major Obstacles

There are many arguments which favor connecting directly to process set points, but let us consider what pitfalls lie in the way. Potentially major obstacles lie in several areas:

a) System reliability,
b) Analytical understanding of process,
c) System complexity,
d) Stability of the control system, and
e) Operator attitudes.

Preparations to overcome all of these must begin, of course, long *before* the installation.

The inter-dependency of the process, operator, computer, and instruments is an essential feature of computer process control systems. The demands which this placed on reliability stood initially as one of the most formidable obstacles to computer control of complex processes. Not only could failures in the computer itself upset and/or damage the process, but common instrument failures, for example, which might be trivial in themselves, could become much more damaging if followed blindly by a computer program. Naturally the basic reliability of the computer is of extreme importance.

Careful planning throughout the system is still required to see that the effects of any failures that do occur, whether in the computer, instrumentation, or the process equipment, are held to a minimum. A large variety of "fail-safe" techniques have been developed for this purpose. In general, this protection is concentrated on the calculation of the computer outputs, their generation as analog voltages, and transmission into the set points of the process controllers.

The computer program is designed to check the operation of the computer itself periodically and, in the event of an error, to signal the operator and to "freeze" without changing any outputs. The program may also be designed to apply certain checks to each instrument reading taken by the system. In the event of a faulty or suspicious instrument it signals the operator and changes the calculation program to utilize data from an alternate source. It may continue to use the last valid reading of the instrument in question, or to take any other predetermined course.

To install a closed-loop computer control system which will optimize a process generally requires a detailed, quantitative analytical description of the process. In the case of one quite difficult study to plan computer control, the knowledge gained resulted in production increase *before* delivery of the computer sufficient to justify the whole computer project. (Utilizing this same knowledge more rigorously, the in-

stalled computer produced a further significant increase.)

A research director of a large chemical company has cited the fact that use of a control computer forces an *understanding of the process as perhaps the most important reason for using computer control in pilot plant work.*

When the operators start tracking the computer outputs, it generally becomes rapidly, if not dramatically, apparent if there is any serious error in the analytical description of the process. The same result generally illuminates the problem. Allowing for this contingency during a startup requires that space be reserved in the memory for the addition of "refined" control equations and that the process analysts and project programmers are on call.

Checking Out the System

Because of the complexity, the best approach to checking out a computer control system is characterized by the slogan "divide and conquer". As stated earlier, the many parts of a computer control system are inseparably bound up in the computer itself. Thus, it is desirable to check every portion of a system as thoroughly as possible by itself and then to assemble the system piece-by-piece out of proved components.

The computer equipment itself should be first checked out using extensive *previously proved* test programs. Simultaneously, the process program should be checked out on a seasoned computer.

Next, the program and computer should be combined for an intensive run-in, simulating the process instrumentation insofar as possible.

Likewise, before the computer arrives at the plant, all of the instrumentation additions and modifications necessary should have been made, checked out, and in use. Changes in the mode just before the computer delivery will generally not contribute to a smooth startup.

When the computer arrives and is installed, certain precautionary checks can save a great deal of time in the long run. Manufacturers recommendations for a preliminary test should be followed in detail. Short-circuiting this test and going directly to the program as a means of testing could result in minor errors remaining hidden indefinitely and would probably result in wasted time if major error exist.

After all the equipment has been checked individually, all of the interconnections made and checked, and the control program reloaded into the computer, a series of open-loop exercises begins. These consist of such things as scanning instruments for failures or for alarm conditions, performing all logging cycles, providing the timing for non-continuous analytical instruments, and computing and displaying operating guides. This period may reveal errors in the planning or operation of the program.

After the system demonstrates that it is trouble-free through the performance of its open loop functions, the computer outputs are connected directly to the process. Typically, one output is connected at a time, and after each connection the stability and the general performance are watched closely. When all the loops have been satisfactorily closed, a series of exercises transferring the control between the computer and the operator may be held to demostrate the hardware and the concept and to provide further training for the operators.

During this period a computer control system may require "tuning" of its dynamic performance analogous to the tuning of regular controllers. A typical computer control system closes loops which formerly were closed with very low gain through the operator, if at all, and hence, the computer will introduce new possibilities for unstable operation. The design of the control scheme should include analysis of the stability of each loop. However, these analyses may have to be based on unreliable or obsolete data (since the process may be changed or new instruments added).

Also, when multiple, cross-coupled loops are involved, the analysis becomes formidable. Minimum precautions should include analyzing all loops to see what *possibilities* exist. Provision can then be made in the program to provide adjustments for these loops similar to the proportional, derivative, and integral action of controllers, except that a much wider range of effective time constants can be achieved. Furthermore, the non-linearities in a process, such as transport times, instrument sampling cycles, kinetic equations, and fixed constraints, can be compensated in more exact fashion than by a linear analog-type controller.

Operator's Functions

The operator's ability and willingness to perform correctly his many duties in a computer control system are vitally important to the ultimate success of the project. They will be directly influenced by the care taken in planning his role, in designing his means of communication, and in orienting and training him for the new project. The best performance of the overall system will be obtained if both the designers and operators recognize those tasks which the operator and those which the computer can best perform.

Briefly, the operator must be ready *at all times,* to resume direct control of part or all of the process. To maintain this capability, occasional practice drills will be necessary. Typically, the instrument checks built into a program will pinpoint the simplest, the most probable, and the most dangerous conditions. Beyond this lies an immense number of remote possibilities, complex combinations of conditions. Gross cross-checks, such as energy and material balances, are programmed to show the operator that, when *something* is wrong, it immediately becomes his job to determine *what is wrong* and to take action.

A typical system invariably requires numerous other detailed duties of the operator: entering laboratory data into the system, inserting production specifications, etc. He is still responsible for the operation of the process, for the quantity and quality of product made, and for taking appropriate action in emergencies. The computer may be considered an extension of his conventional control system which should enable him to turn in better performance. Providing information and training in this role should do much to reduce the apprehensions sometimes felt in the approach of "automation".



WILLIAM S. AIKEN received his BS in physics from Yale University and his MS in physics, electrical engineering, and mathematics from Massachusetts Institute of Technology where he was also a research assistant in electronic design.

His seventeen years' experience includes work in guidance radar systems, aerial instrumentation, circuit development, and missile systems while at Sperry Gyroscope, as well as project engineering work on RW-300 computer installations at The Thompson-Ramo-Wooldridge Products Company.

Aiken was project engineer on the first industrial control computer system ever installed — at Texaco's Port Arthur refinery — and Manager of the Project Engineering Department before assuming his present position as Director of Engineering.

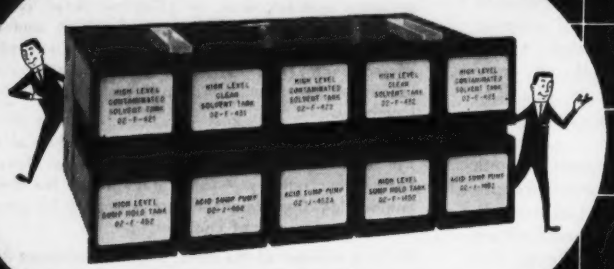
He is a member of the senior staff of Thompson Ramo Wooldridge Inc., a senior member of the Instrument Society of America, and an associate member of Sigma Xi.

Program Follow-up

After a system is declared officially operational, a program of specific engineering follow-up should be maintained for eight to twelve months. Basically, such a program is needed because all possible process situations cannot be expected to occur during the relatively short startup time. Difficulties may develop slowly or suddenly over an extended period of time. This follow-up project might require that process engineers:

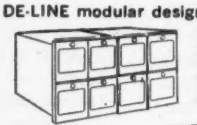
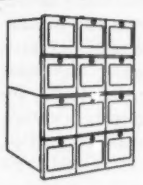
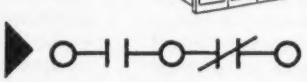
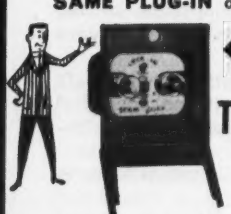
a) Calculate the payout of the system.
b) Look for any difficulties that may be present or incipient in the computer's control functions.
c) Check the operator's adaptation to the system and the suitability of their means of communication.
d) Check computer-logged process data and calculations to see if the analytical description of the process can be improved upon.
e) Check to be sure that all system features are in active use.

Such a program can contribute important insurance to the success of the installation, and should improve the basis of knowledge for planning future ones. ■

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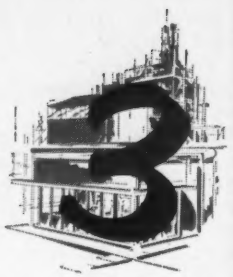
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Computer/instrument user sets forth need for special diagnostic programs in properly . . .

Evaluating computer control



ROBERT F. CARROLL,
Senior Engineer
B. F. Goodrich Chemical Company

Successful evaluation of computer control necessitates the evaluation of the complete computer system, and the related computer hardware. The success of computer control is measured by the increase in yields from raw materials and the reduction of operating costs. To perform a proper study of evaluation, the following items must be investigated:

1) Computer hardware
2) Computer safety
3) Process operation versus math model
4) Optimization program economics

For all of these items, it is essential that special diagnostic programs be readily available to aid in the evaluation.

'Built-in' Programs Aid Diagnosis

All of the programs that make up a computer's scheme contain numerous simple typeouts which give a permanent record of what decisions have been made. Most computers also have a program which allows the operator to inspect any part of the computer's memory without interrupting the normal operation of its programs. This program is used extensively by the engineers to check on the performance of the input equipment (especially the pressure to electrical transducers) as well as the results of the various computations involving the plant variables.

Another special program which is used in evaluating the computer's operation is one which simulates a computer or critical instrument failure. This permits routine checking of the full-scale equipment and programs. Thus the process is periodically switched to normal instrument control and the computer is put through a simulated failure.

Optimizing the Program

Overall conditions of the plant are determined by the optimization program. However, actual control of the various units in the plant may be thought of as a collection of small programs carrying out these desires. Process must be checked to determine if it is operating within the limits of the mathematical models that make up those programs.

Process changes between winter and summer operating conditions might tend to make the math model less accurate (i.e., any derived function that was curve fitted for a particular range must be checked). Each part of the process may be operated separately on computer control. This allows the smaller programs to be tested and studied. The rate of control action may be studied and varied to suit each operation.

Material balance checks around any unit or the whole plant is, of course, very important. Obviously the longer the test period, the more likely the agreement. The greater volume of materials tend to average out any inaccuracy in data accumulation.

In the case of B. F. Goodrich Chemical Company's plant at Calvert City, Kentucky, the plant may be run with or without computer control. This provides a good opportunity to compare the

operations and efficiency of the plant when run by regular controls as opposed to computer controls.

Even if the difference between these operations is satisfactory, the object of evaluation is to determine if the most perfect conditions have been reached. This is a direct function of the math model. Unless the plant has been operated for many years and good data are available to provide statistical analyses, the plant may not be operating at peak efficiency. Actual control data from the data logging part of the program, aided by off-line statistical analysis, will usually indicate whether the optimizing math model needs improvement.

Any program change must be thoroughly tested for all possible program routes and for the actual output control changes. All parts of the system are important and one weak link may influence the efficiency of the whole plant.

Process computer control is a relatively new tool, and there is still much to be learned about using it effectively. Generally, the *computer is limited by our knowledge of the process and our ingenuity in applying it correctly.* ■

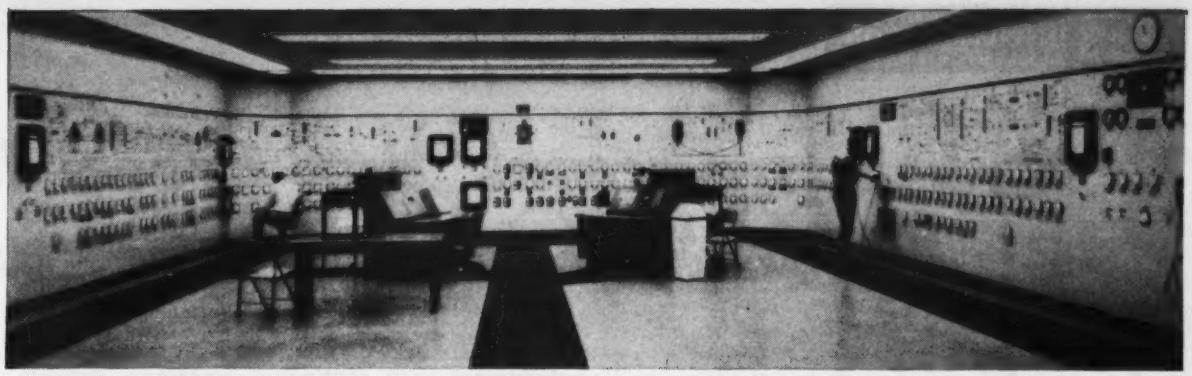


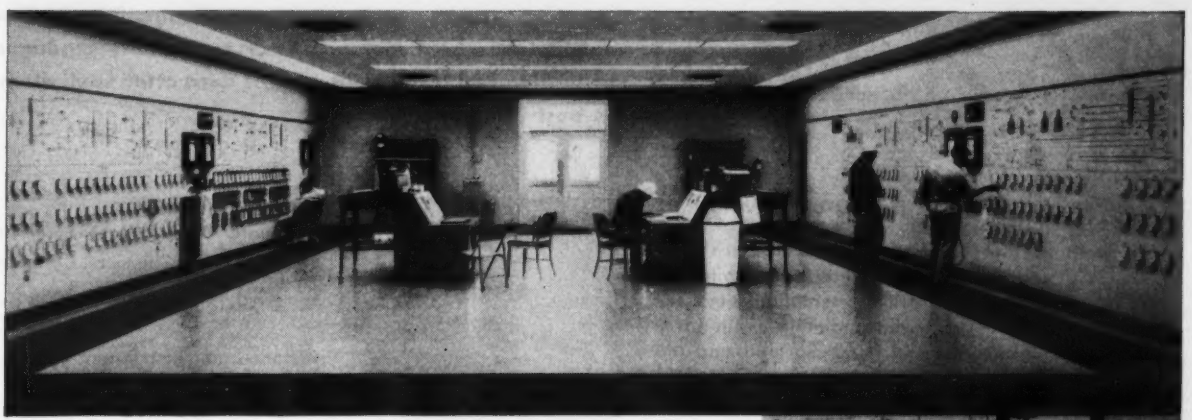
ROBERT F. CARROLL attended Ohio State University and graduated in 1951 with BChE and MSc degrees.

He joined B.F. Goodrich Chemical Company in 1951 at the firm's Avon Lake, Ohio, development center and worked on process development of chemical monomers. It was here his first contact with computers occurred, involving process simulation with an analog computer. Later he developed interest in digital computers.

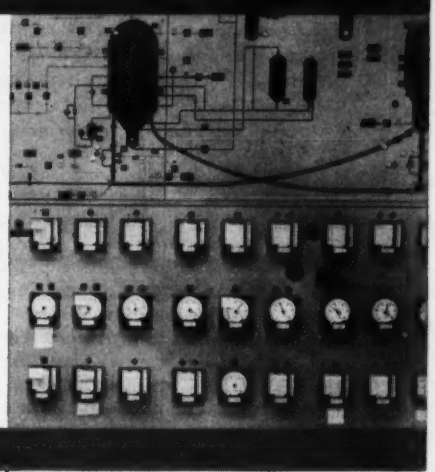
When BFG Chemical decided to install an RW-300 at its Calvert City plant, to control two processes — the vinyl chloride and acrylonitrile plants — computers became a full-time occupation.

Mr. Carroll was transferred to Calvert City in May, 1959. His current assignment is the application of computer control to processes.





Bristol Metagraphic recorders and indicators occupy lower three rows on panel (shown in two photos above). Enlarged panel section is shown below, right.



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'Crash programs' can breed failure in continuous on-stream analysis

Disenchantment with continuous on-stream process analyzers can often be traced to over-eager chemical companies and excessively zealous instrument makers. A cursory, poorly managed problem investigation and insufficient process data often spell disaster for the best-intentioned projects

LOUIS W. SALZER
Associate Development Scientist
B.F. Goodrich Chemical Company

A fizzled-out revolution?

Just a few years ago, continuous on-stream process analyzers were being hailed as a revolutionary instrumentation development. Now, many disappointing experiences later, the talk is not so loud and the forecasts not so exuberant. What happened? We asked Louis Salzer of B. F. Goodrich Chemical Co. to give us his slant on this problem. Having worked with both Consolidated Electrodynamics and Standard Oil (Ohio) in the past, he is well acquainted with both sides of the instrumentation street.



MR. SALZER

Continuous on-stream process analyzers are rapidly replacing the former one-or-two-sample/day analyses performed by laboratory personnel—but not without anguish. Seldom if ever is such on-stream-instrumentation installation without its woes.

There are many reasons why a good deal of difficulty is experienced in these devices. Disaster is often due to the fact that no one person in a chemical plant is designated to aid in the problem investigation.

In too many instances a group of people — each one with slightly different ideas on what is to be controlled by the instrument, and slightly different over-all goals — is given the responsibility of selecting the specific analyzer to be purchased and establishing its use. As a result, a complete and accurate picture of the entire process is lacking.

Another problem encountered in customer/instrument-manufacturer relations is the insistence by some chemical companies on an analyzer which is not ready for production. The manufacturer produces the instrument, realizing that if he does not he may lose a customer. The unproved little-tested new analyzer is sold with the hope that it will be satisfactory. When it proves unsatisfactory, the sale may cost the manufacturer many dollars in finding the solution, or it may mean a lost customer.

Perhaps a manufacturer should refuse to supply the instrument until a well-planned and proved instrument is ready, even if it means a lost sale. They must realize that it is the repeat sales that are profitable.

Of course, over-zealousness due to competition is also a fault of manufacturers. For instance, an instrument company announces a new on-stream analyzer. Immediately their rivals start a frantic development and merchandising program to get on the bandwagon. Each claims it has the best product.

In reality, the analyzers thus produced have not been proved and certainly could not be tested over the necessary period of time. These inadequate instruments are likely to cause a good deal of friction between the manufacturers and chemical companies.

On the other side of the coin we find a chemical company hearing a rumor that its competitor is using a new analyzer, and in so doing is making a superior product at a lower cost. This competitor immediately demands such a product. Instrument people furnish the analyzers under protest, with the same result discussed above.

If a company purchases an on-stream analyzer which causes trouble and needs a great deal of maintenance, invariably the degree of trust that plant people have in this and other forms of instrumentation drops to a low ebb. The faulty instrument may be taken out of the process and older methods of control reinstated. It can take many months or perhaps years to build up their confidence to a level where another analyzer will be employed.

Accuracy and Dependability Tougher to Obtain

Plant people do not want data that are accurate 90% of the time. Accuracy must be maintained approaching the 100% mark. This is a most difficult requirement, but one that must be the goal. Economic considerations will justify this viewpoint.

An on-stream analyzer may increase efficiency by only 1% or 2%. A faulty instrument can decrease this efficiency level to a point well below that obtained with the older conventional controls, and in severe cases may actually shutoff a unit. Everything gained in the more efficient operation is thus lost in a few hours or days.

Reliability of the complete analytical and control system is of equal importance to any other factor in instrumentation. Accuracy and reliability of on-stream process analyzers is much more difficult to achieve than with conventional laboratory instruments. For one thing, the continuous unit is expected to operate 24

hours a day, week after week, with a minimum amount of maintenance.

A laboratory device operates only a few hours each day, and malfunctioning of the instrument is observed almost immediately. Perhaps only an electronic tube needs replacing, and in a few minutes the cause is found and eliminated. In contrast, the malfunctioning of an improperly monitored on-stream analyzer may go undetected for several hours, or until the process is in obvious difficulty.

The ability of the instrument to meet the above-named requirements should be the responsibility of the manufacturer. Instrument companies should also be expected to supply the necessary controllers which are used to stroke a valve or change some other condition of the process. To do a good job, instrument people must be provided realistic process data. They should demand these of their customers.

Chemical companies are sometimes hesitant to relate information of this nature because of competitive reasons. Under these circumstances, the purchaser must assume the responsibility for a possible error in the selection of the proper instrument. Complete confidence is necessary, and instrument companies must, of course, treat all correspondence and data in strict confidence.

Adequate Sampling Is Basic to Success

Sampling can be a problem and should be one of the first details to be worked out on a basis mutually acceptable to both user and instrument manufacturer. Sampling and limitations of the instrument often go hand in hand. The sample must be representative of the system.

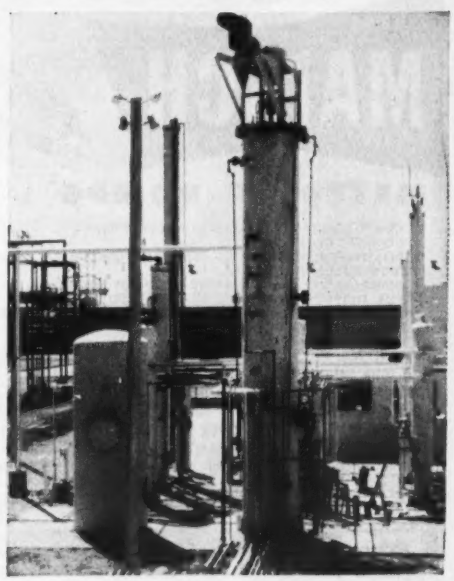
Proper location of the sampling line is important. Since the line may be a few or many feet in length, a temperature and pressure differential will usually exist. For example, should one component in a gaseous stream be

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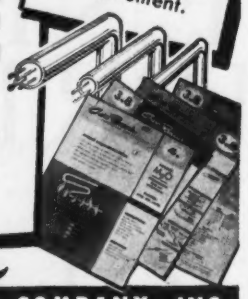
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at its condensation point, the sample as seen by any instrument is different from that in the main line. Many times it is necessary to heat the line in order to prevent condensation and help insure a truly rep-representative sample.

Sometimes solid particles may be in a stream, or perhaps components which polymerize slowly are present. Either can lead to a blocked sampling line with the resulting loss of data and control over the process. It would be well for instrument manufacturers to be aware of the possible difficulties that could occur in a few weeks or even a few months after an installation.

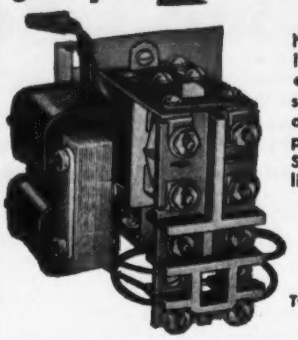
Some process streams are not perfectly adaptable to on-stream analyzers. Spectrophotometers, for example, can give inaccurate results because of stream composition. Frequently a stream will contain components that will slowly form a film on the cell window with a resulting change of sensitivity and inaccurate data. In many cases, pH instruments are plagued with a similar trouble. Electrodes coat over with a film, and again results are in error. In all situations of this type it is necessary to clean electrodes or cells if good results are to be obtained.

Another cause for concern is the instrument manufacturer who disregards small amounts of impurities in streams. Sometimes only a tiny amount of these impurities has a serious adverse effect on the accuracy and performance of an instrument. This is particularly true of instruments designed for binary mixtures. Instruments measuring such properties as refractive index, thermal conductivity, composition by density measurements, electrical conductivity and moisture content can give erroneous results due to these "minor" impurities.

In addition to being aware of the stream composition, it is important to understand the effect these various components will have when present. Instrument makers should request a typical analysis, along

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with the likely range of results. They should also know what other components might be present in the process stream from time to time. If the process stream is one that has not been instrument-controlled, or if the manufacturer has had little or no experience with a stream of the type under investigation, it would be wise for them to request a sample. It can then be run continuously until all feel the instrument will do the job ■

Hours of stream data studied at-a-glance

Uses: Peak-picking in process-gas chromatography or other measurements of individual stream components.

Features: Unit records peak heights only, printing them as successively numbered points on slowly moving chart. This permits hours of stream analysis data to be studied in recorder window at any given time.

Description: Peak-picking recorder is equipped with one set of input terminals and multi-point printing head. Each unit impulse drives pointer up scale. No printing is done, however, until electronic detector senses peak signal.

Detector then activates printing head, advancing it to next number. With dust-resistant case, overall dimensions of unit are 17¾" wide by 13½" high by 15" deep.

(Peak-picking recorder 6707 is product of Weston Instruments Division, Daystrom, Incorporated, 614 Frelinghuysen Ave., Newark 12, N.J.)

Check 4255 opposite last page.

More Instrumentation

. . . viewpoints, ideas and techniques—along with news of the latest products and literature in the field—are all included in the continued part of this Instrumentation Feature on page 93.

For on-the-line package weight control — W-C CHECK-WEIGHING SYSTEMS



Whatever your requirements for production check-weighing of packaged materials, W-C can supply a job-engineered system to meet them. Systems can be automatic or manual; can weigh in motion or stop-and-go; can segregate packages according to specific zones of under- or overweight, or according to a single pre-selected tolerance. They can provide practically any type of readout you want, and can be readily integrated with tape-fed, punched-card and other types of data handling systems.

Surprisingly, such job-engineered systems can be delivered at a most realistic cost—probably less than you'd expect. The reason why is a simple one: pre-engineered components, unitized design. There is no speculation or experimentation; W-C systems are designed on the very practical basis of service-proven, standardized components.

Typical applications include: Checking weight of tire treads as extruded . . . checking container weights after automatic filling . . . checking multi-unit package weights.

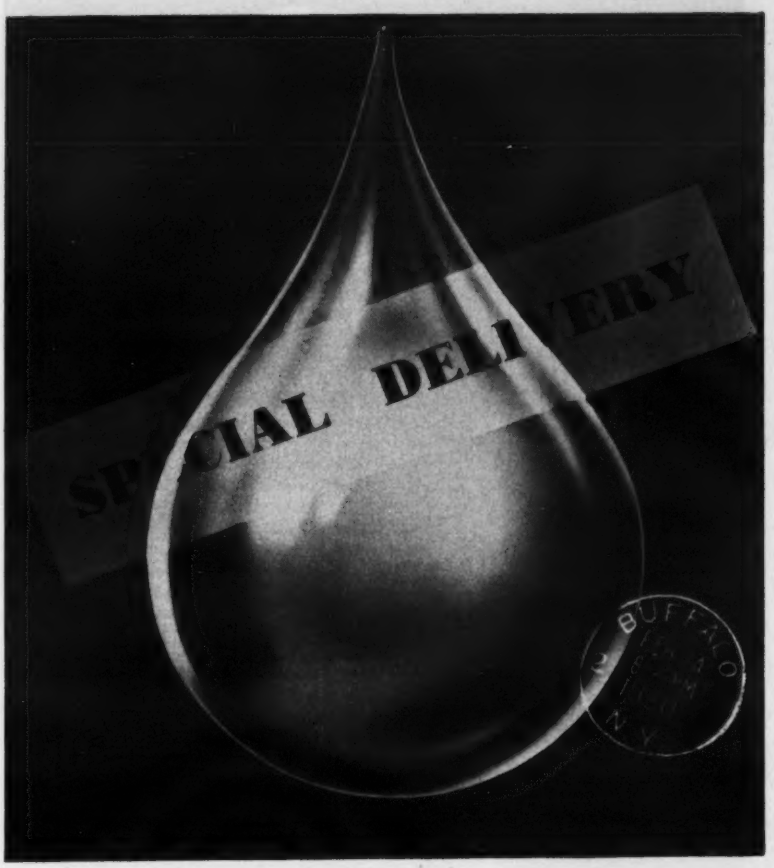
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W&C WEIGHING & CONTROLS, INC.
Div. of CompuDyne Corp.

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S.A. 2124

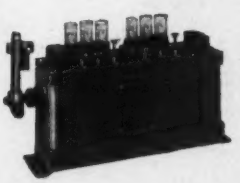
Check 4254 opposite last page.

HOW FAST should you



deliver a drop of oil?

Whether you're operating high-compression diesels or fast-moving shear knives, you're probably paying more and more attention to lubrication *timing*. Whatever your field, our engineers will be glad to study your requirements and make specific recommendations. Your needs can be met either by adapting an existing model — or we will custom-build you your own lubricating system. Write for our catalog. Manzel, 251 Babcock Street, Buffalo 10, New York. You will get exact, on-time lubrication if you



ask the man from

A UNIT OF HOUDAILLE INDUSTRIES, INC.

Manzel

SPECIALISTS IN LUBRICATORS AND METERING PUMPS SINCE 1898

Check 4256 opposite last page.

Moeller Exclusives Provide Timeless Accuracy

Moeller Mercury-Actuated-Dial-Indicating Thermometers are designed and constructed to provide dependable accuracy with minimum maintenance. They are available both in direct reading and remote types.

Gasketed phenolic cases are furnished in 4½", 6" and 8" sizes for flush or surface panel mounting. Brass cases can be furnished on special order.

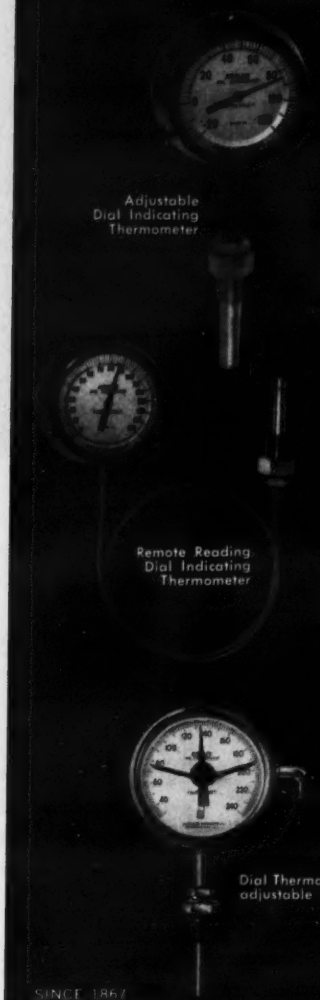
Standard ranges are supplied between −40° F. and +1200° F. Special ranges and combination scales can be made to order. The bourdon spring, which is the heart of the instrument, is specially designed and heat treated for long life and accuracy.

Moeller Micro accurate stainless steel capillary tubing has a smooth internal diameter, held to close tolerance. Standard armor is spirally wound stainless steel. Other armors such as smooth lead, polyvinyl chloride, etc., are also available. Tubing lengths can be furnished up to 150 ft. Lengths over 50 ft. may be ordered with full compensation. Anti-parallax scales are standard.

All dials are compensated for temperature variations around the case. Units are available with plain bulbs, union connection bulbs and separable sockets. Separable sockets also can be fabricated from all commercial metals with thread, flanged and Van Stone connections.

Dial thermometers can be furnished with high and low alarm contacts.

Moeller has a dial thermometer to meet your specific needs. See your Moeller Representative or write today for Catalog No. 150.



SINCE 1867



MOELLER INSTRUMENT COMPANY, Inc.
132nd Street and 89th Avenue, Richmond Hill 18, N.Y.

Representatives in principal cities.

Check 4257 opposite last page.

Colorful Plants

From page 30

ment green, the same color as the discolorant.

Corrosives are tough on any coatings and their effect shows up quickly with bright colors. Type of product being made helps determine how feasible it is to use colors on a process plant.

Benefits Often Intangible

One difficulty in assessing value of plant beautification is that benefits are largely intangible. It is difficult to sell such a program to management that wants concrete evidence of savings in dollars and cents. In some areas, sufficient land is not available to permit considerable space between various processing units. Primary consideration in choice of coatings for a plant, besides beautification, is their ability to resist the various corrosives encountered.

Epoxies Resist Corrosion

Practically all of the coatings in both the polyvinyl chloride and polyvinyl alcohol plants at Air Reduction are epoxies. For the areas where severe corrosives are encountered, Chemfast primer and Chemfast finish coat are used. Usually, three coats are used for a total thickness of four or five mils.

In less critical areas, Speedrex primer and finish coat are used. In these cases, only two coats are usually used for a total thickness of three or four mils.

It is believed that the coatings will withstand the corrosives involved. No evidence has been developed to the contrary during the period of nearly a year that the plants have been in operation. They are subjected to caustic, hydrochloric acid, chlorine, various solvents, high humidities and elevated temperatures.

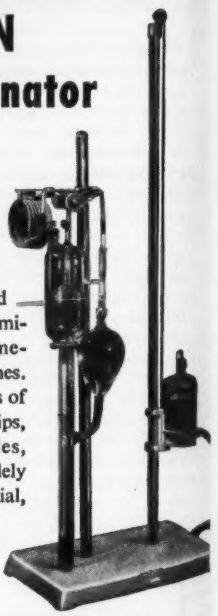
(Chemfast and Speedrex protective coatings are products of Truscon Laboratories, Industrial Maintenance Division, Devoe & Raynolds Company, Inc., 1700 Caniff Street, Detroit 11, Michigan.)

Check 4258 opposite last page.



DIETERT-DETROIT

CARBON determinator NO 3003



Determine carbon content in just 2 minutes! No complicated mathematics; eliminates costly time-consuming routines. Accurate analysis of borings, mill chips, crushed samples, pellets, etc. Widely used in industrial, commercial and research laboratories.

FREE *Dietert-Detroit 16 page Catalog illustrates both Carbon and Sulphur Determinators and accessory equipment.*

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Check 4259 opposite last page.

Upflow Digester's Thermal Stability Boosts Pulp Uniformity

Quality control is simpler task at Hammermill Paper, where unique reactor continuously delivers 125 tpd

Continuous pulping of hardwood—using an *upflow* instead of a *downflow* digester—is successfully being conducted at Hammermill Paper Company, Erie, Pa. A definite departure from conventional designs, the four-story-high vertical unit has satisfactorily passed its shakedown tests and is currently turning out over 125 tpd of pulp (moisture-free basis). The digester is part of the plant's $20-million expansion program engineered and constructed by The Rust Engineering Company of Pittsburgh, Pa.

Standard mill-size chips are fed into the upflow unit. Sodium-base cooking liquor has same composition as that used for batch operation. Retention time is normally about 2½ hours at 250 psi—but this varies with changes in throughput rate and cooking temperature (200-300°F). Pulp from the digester is sent through subsequent refining operations without any changes in treatment from that used in conventional processing.

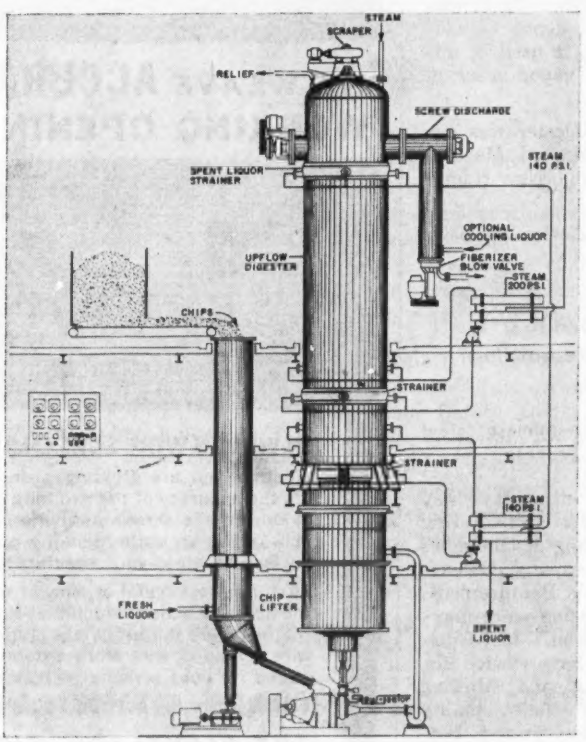
Temperature Stability Tops

In addition to the inherent benefits of continuous processing, the upflow digester provides excellent thermal stability. It is this factor that gives the design an edge over downflow-type units.

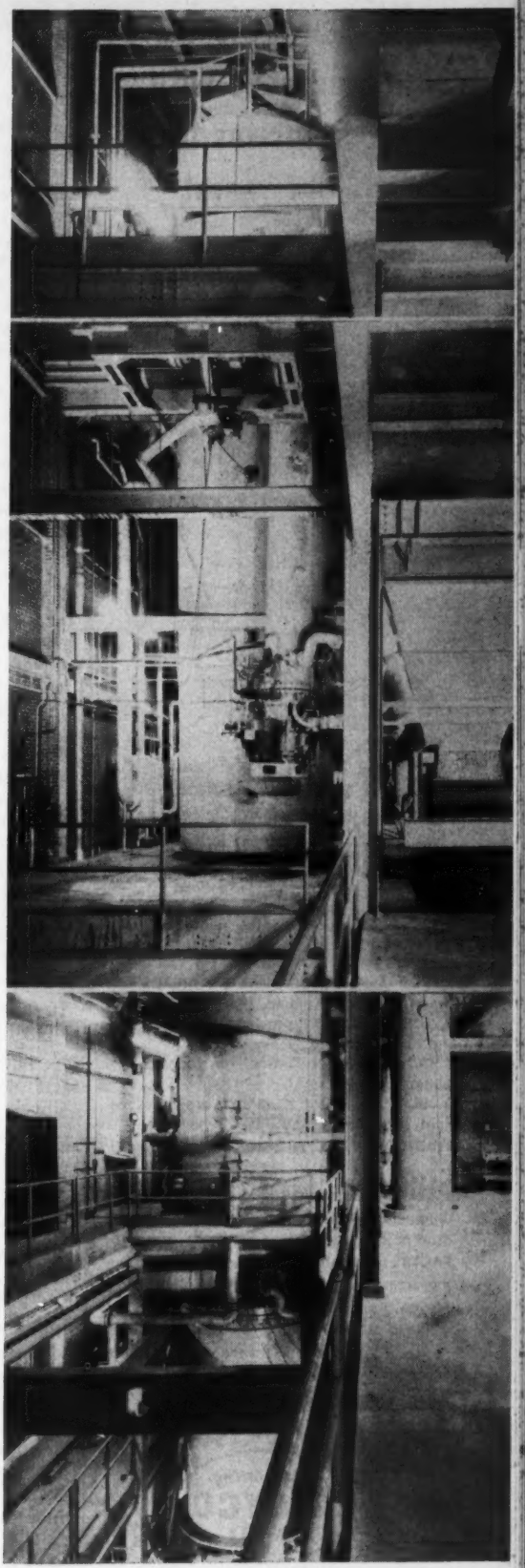
Thermal convection in all vertical digesters tends to move hot liquor to top and cold to bottom. When system becomes stabilized, temperatures become relatively constant across any horizontal cross section. Much higher cross-flow pumping rates are needed in downflow units to maintain uniform temperatures.

In the upflow design, stable temperature gradients as much as 100°F can be maintained in only a few feet of height. Countercurrent heating of the pulp is also possible, with hot liquor flowing downward through the upward advancing cold mass.

The heating efficiency inherent in the upflow design permits use of small flow rates in the circulating systems, approaching the theoretical rates for countercurrent heat transfer. Combination of these favorable conditions results in uniform cooking and good quality control. *To next page*

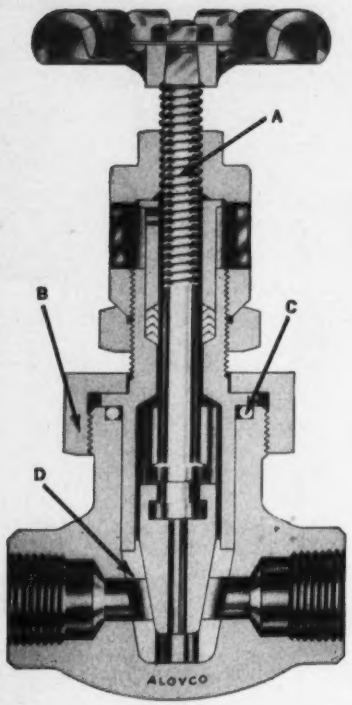


Simplified sketch illustrates major components and flow of materials through upflow-design, continuous digester



Composite view of digester. Photos cover four floors and were consolidated to show overall installation. Digester measures 9' diam by 100' overall height

Aloyco Plug Gate Valve #66 succeeds with severe corrosives for 10 straight years!



Shown ½ actual size of the half-inch valve

WHY? **A. OUTSIDE STEM THREADS** are away from corrosive area, prevent galling.
B. UNION BONNET provides extra strength and easy disassembly.
C. O-RING made of "Teflon"* provides tough, leak-proof seal.
D. SEATS made of "Teflon"* are pressure-tight, dependable, won't gall. Renewable.
STAINLESS STEEL: 18-8S, 18-8SMo, Aloyco 20.

FOR: Instrument lines, small lines handling viscous fluids, or where low pressure drop is important.
FACTS: full-floating plug disc exerts no twisting action on the removable seat in closing. Aloyco Stainless Steel #66 Plug Gate Valve: 1200 lb. at 150 F.; 600 lb. at 500 F. Sizes: ⅛", ¼", ⅜", ½". Want more? Write: Alloy Steel Products Company, 1302 West Elizabeth Ave., Linden, New Jersey. O.S

*Registered DuPont Trademark

Longer Lasting ALOYCO VALVES
FOR IN CORROSIVE SERVICE

ALLOY STEEL PRODUCTS COMPANY

Check 4260 opposite last page.

NEW SOLUTIONS

From preceding page

At Hammermill, chips coming from storage silo are first metered into a downflow soaking tower. Fresh cooking liquor enters bottom of tower. Chips and liquor are then fed into the pressurized digester by means of a 250 psi, positive-displacement feeder known as a Skew-jector.

Entering reactor, mixture is sluiced into a chip lifter which slowly moves the mass up through the digester. Lifting device is essentially a large perforated piston extending full diameter of the vessel. Total height of stroke is about one foot. Power requirement for machine is 30 hp.

Liquor moves independently of the chips and overflows through strainer at top of digester. Cooked chips are removed by scraper and transferred by screw conveyor to fiberizer blow valve. Blow line goes to a cyclone, from which stock is sluiced to washing and subsequent refining operations.

Spent liquor drained from chips at top of digester is used to heat incoming liquor. Steam at 140 psi heats both stages of the digester. For higher production rates, steam at elevated pressure is used in upper stage and vapor space at top of unit.

(Continuous digester was designed by Improved Machinery, Inc., Nashua, New Hampshire.)

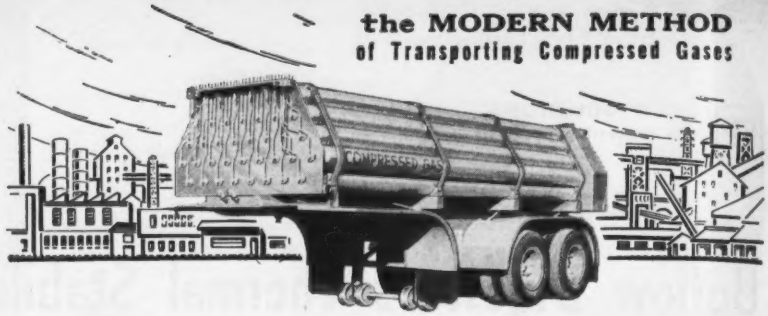
Check 4261 opposite last page.

Whiskey chilled to 0°F, filtered before bottling at Glenmore

All-flanged, stainless steel pipe serves process

All-flanged pipe plays key role in the new chill-filtering process operating at Glenmore Distilleries Company, Owensboro, Kentucky. Requirements for the application were maximum sanitation, easy dismantling and long service life.

The chilling and filtering unit assures high quality bourbon whiskey prior to bottling. Operating at 300 gph, unit chills product to below



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WE WEAVE ACCURATE "WORKING OPENINGS"

IN WOVEN WIRE SCREEN AND WIRE CLOTH PRODUCTS

Whether you are grinding, sizing, scalping, dewatering or filtering it's the accuracy of the "working opening" that makes the difference in woven wire screen and wire cloth products. We pride ourselves in weaving accurate "working openings", an engineered screening surface to meet your specification.

First, the best metal or alloy is selected—hard enough to withstand the abrasive action—ductile enough not to break under stress. Next, the best wire diameter and crimp are determined. Then we weave wire screen or wire cloth around accurate "working openings" best suited for your screening application.

FREE! Write for bulletin 160 giving complete details and facilities.

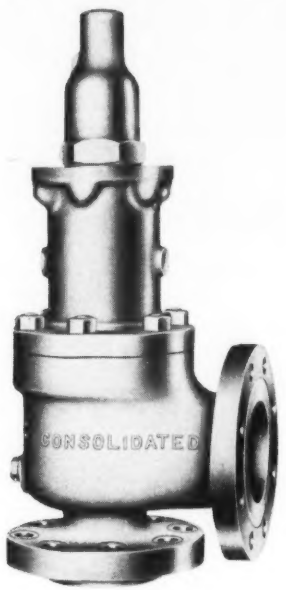
THE CLEVELAND WIRE CLOTH & MFG. CO.
3577 EAST 78th STREET • CLEVELAND 5, OHIO

Check 4263 opposite last page.

seal

CONSOLIDATED SAFETY RELIEF VALVE'S Sealing Bellows protects against damage from contaminants, corrosion, or viscous fluids

saves



Consolidated Safety Relief Valves are available in both Balanced Bellows and Standard designs. The Standard type has an eductor tube that effectively removes bonnet pressure.

Balanced Bellows Type Consolidated Safety Relief Valves have a durable, two-ply stainless steel Sealing Bellows that isolates and protects working parts from destructive elements in the lading fluid.

The bellows is balanced with the seating surface. Even with superimposed back pressure in the relieving system, valve performance is consistently stable and dependable. The bellows does not affect the high capacity of the valve, nor does it require change in set pressure. Even the blowdown adjustments are limited.

Additionally, Consolidated Safety Relief Valves now offer a no-leak tightness maintained by a resilient "O" Ring Seat Seal retained in the valve disc. This Seal assures tightness at operating pressures far closer to set pressure than with metal-to-metal seats alone, yet does not carry the seat load imposed by the spring. The Seal also takes piping strains much better than all-metal seating.

The Sealing Bellows and "O" Ring Seat Seal are typical of the extra quality built into Consolidated Safety Relief Valves to assure absolute protection for personnel and plant. These fine features plus flat seating and single ring construction also eliminate many maintenance problems and costs. Write for Catalog 1900 and Bulletin 1940.

MANNING MAXWELL & MOORE INC. M&M TRADE MARK

CONSOLIDATED SAFETY RELIEF VALVES

A product of

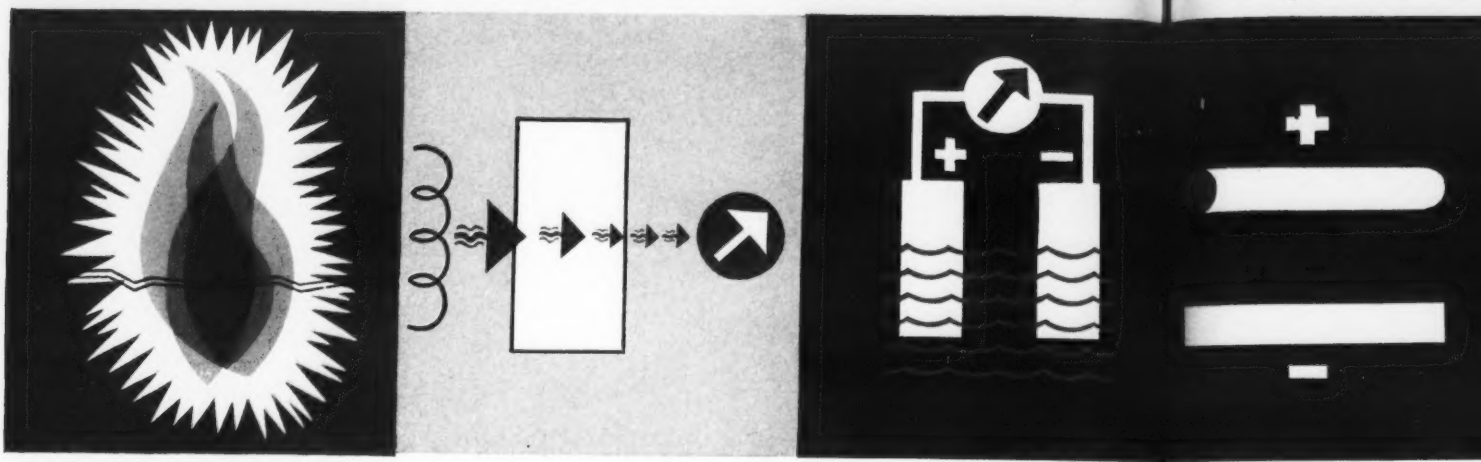
MANNING, MAXWELL & MOORE, INC.

Valve Division • Tulsa, Oklahoma

In Canada: Manning, Maxwell & Moore of Canada, Ltd., Galt, Ontario

Check 4264 opposite last page.

MSA Instruments apply all these principles for dependab



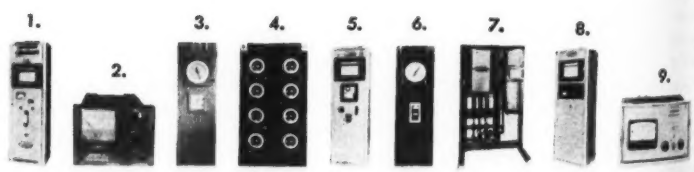
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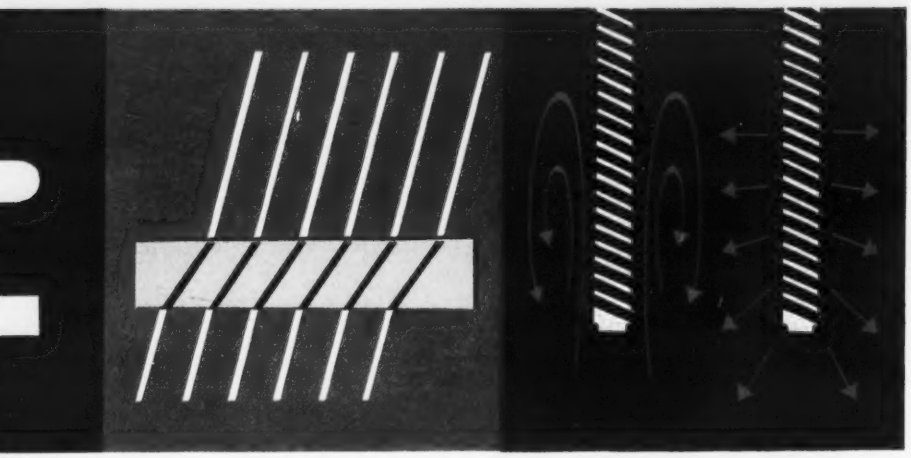
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Pittsburgh 8, Pennsylvania



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*Trademark

lable process stream analysis



Refraction

Thermal Properties

plifies con-
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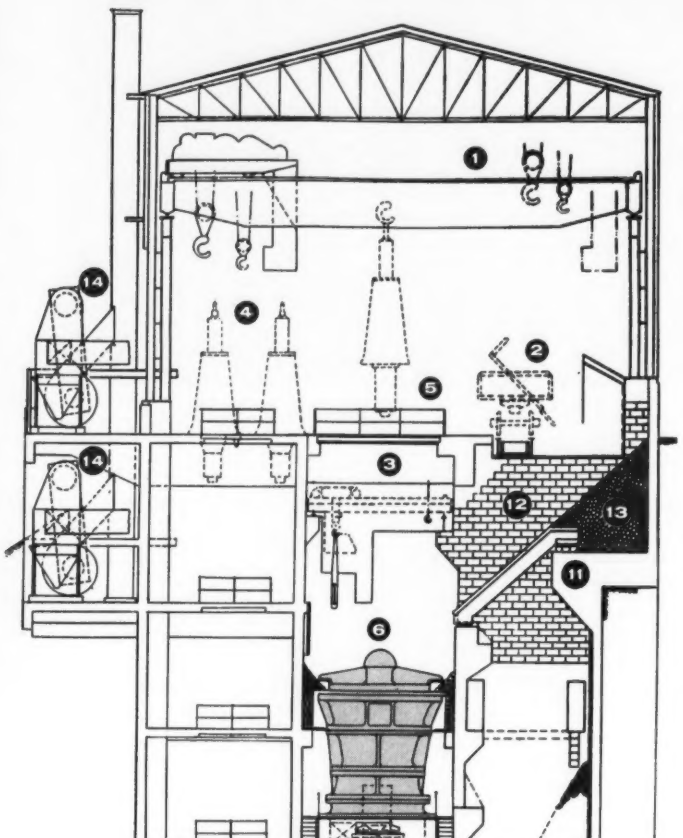
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world's largest manufacturer of 60" gyratory crushers designed and built this giant for installation in Peru.

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Drawing shows Traylor 60" gyratory crusher operation:

1. 100-ton crane with 25-ton auxiliary hook and operator's cab
2. 43-cu. yd. side-dump mine car
3. 20-ton crane with rock hook
4. Mantle storage
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7. Hydraulic hoist, 14-ft. lift, 25-ton capacity
8. Two 72-in. pan feeders
9. Two 54-in. chain-belt conveyors
10. Electrical control panel
11. 8-in. grizzly
12. 2-in. plate liners
13. Dead-bed areas
14. Air filter dust removal unit

Other Traylor Crushers made for primary, secondary or fine reductions. Write today outlining your crushing requirements and let Traylor's engineers make recommendations . . . or ask for Bulletin No. 1126.



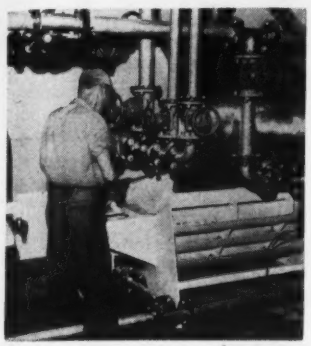
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Check 4265 opposite last page

0°F and pumps it at 60 to 65 psi through vertical stainless mesh filter sheets holding a filtration pad of diatomaceous earth. A sparkling, clear product is obtained.

Glenmore specified light wall stainless steel for all pipe and fittings serving the unit. Schedule 5S and 10S were considered ample for the pressures involved and cost one-half to one-third less than standard weight equipment. The flange design filled the bill for ease of assembly and dismantling.



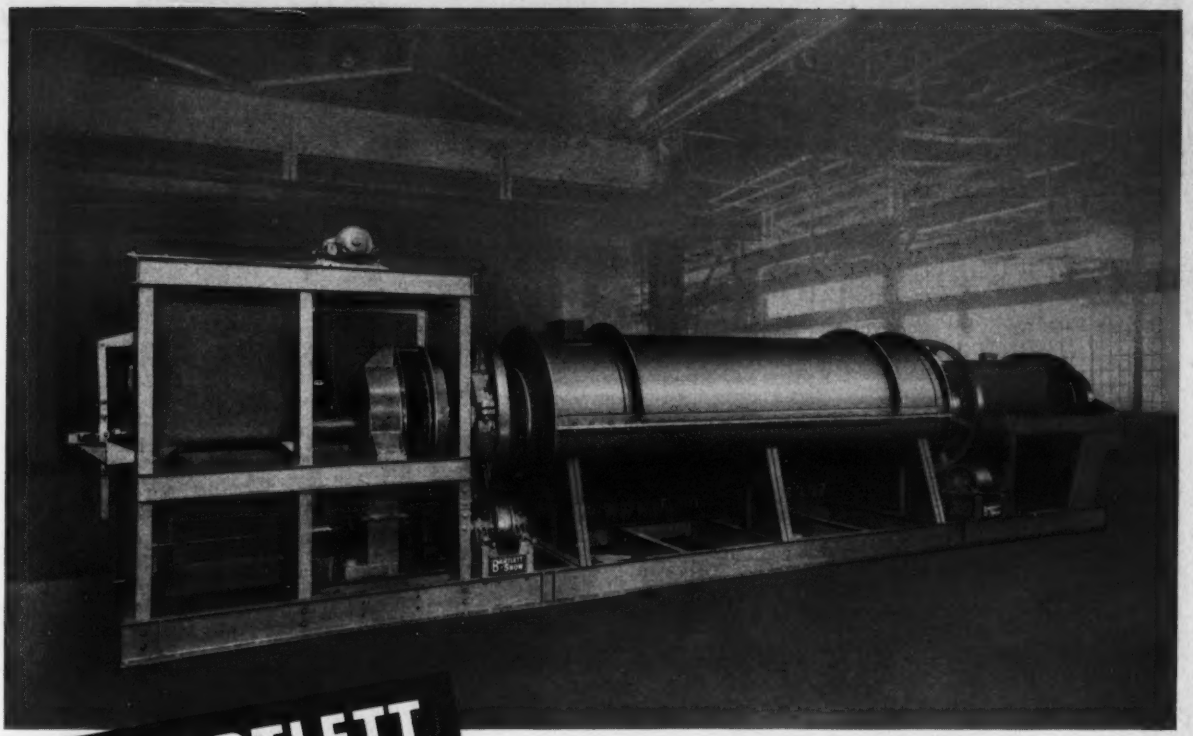
Light wall, stainless steel pipe and efficient flanges simplify cleaning and assure maximum purity of whiskey passing through chill-filtering process

Flanged assembly consists of two components, a stainless steel insert with circumferential bore grooves into which pipe or fitting is cold expanded to form a tight, locked-in-bond. Other component is a forged carbon-steel flange that rotates freely around the insert for easy bolt alignment. Unit provides strength at the connection and full corrosion resistance in the line. There are 300 such joints in the installation.

(Further information about light wall stainless pipe and fittings may be obtained from Tube Turns Division of Chemetron Corporation, P. O. Box 987, Louisville 1, Ky.)

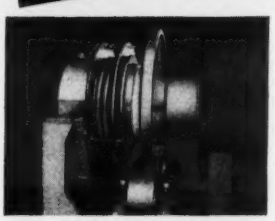
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For more information on ad on preceding spread, specify 4267 . . . see information request blank opposite last page.



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ROTARY CALCINERS



Close-up View of Breeching and Bellows Type Seal to Maintain Special Atmosphere.



High Temperature Rotary Calciner Showing Electrically Heated Furnace and Integral Cooler.

. . . permit materials to be processed continuously at temperatures to 2100°F. in a reducing, oxidizing or neutral atmosphere, and cooled to approximately 200°F. before discharge.

Bartlett-Snow Continuous Combination Rotary Calciners and Coolers are ideally suited for processing a wide variety of materials. The entire assembly including the fuel fired or electrically heated refractory lined furnace, feed hopper, variable speed feeder, seals, and breechings are all supported on a single rigid frame to assure proper alignment and efficient, trouble-free operation. Tubes are made of special alloys as dictated by the material being processed.

Complete laboratory facilities enable us to determine the time cycle, temperature, special atmosphere and other conditions—and produce actual samples of the final product before the production unit is designed or built. Let us work with *you* on *your* next job!

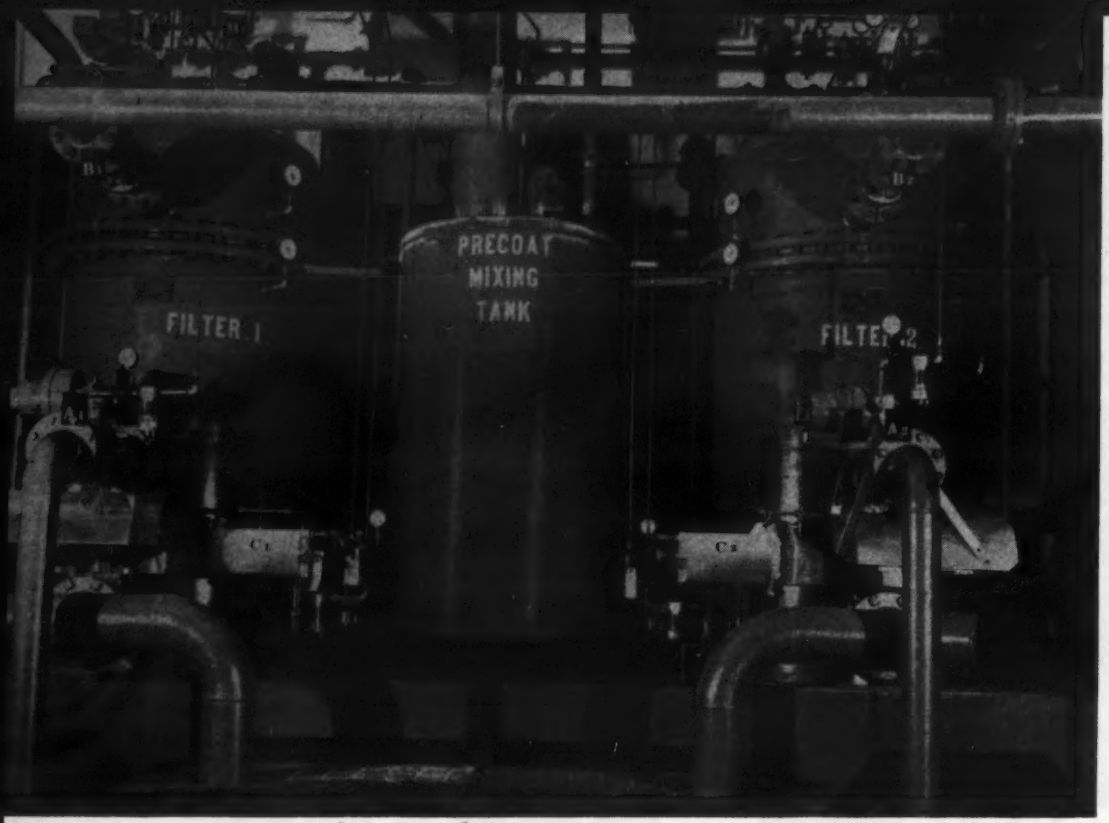
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Bulletin No. 118 gives full details. Send for a copy Today.

Check 4268 opposite last page.



Filter plant which helps to maintain the high quality of Rheingold beer

Labor savings pay cost of automatic filters

Units equipped with timed-program controller provide 300 gpm of crystal-clear water

GORDON WEYERMULLER
Associate Editor
with **MILTON JOHNSON**
Ass't. Plant Supt.
Liebmann Breweries, Inc.
Brooklyn, New York

Problem: Quality of water used by Liebmann Breweries to make Rheingold beer is exceptionally pure, coming from the Catskills in upper New York State. However, the lines in Brooklyn through which the water flows are very old. Large changes in flow occasionally caused encrustation to come off lines resulting in a turbidity not wanted in brewing water.

Solution: In the summer of 1959 brewery installed two diatomaceous earth filters in parallel, with automatically timed filter cycles. The filters are used on an alternate basis, so production is continuous despite need for periodic cleaning.

Each filter contains porous stone tubes, which are inert to most corrosives. A slurry of diatomaceous earth in water is used to precoat filter tubes before filtration. As water is filtered, slurry is constantly fed in to keep bed porous. Only manual operation involved is the occasional addition of filter aid to mix tanks. Diatomite cake contains over two million microscopic pores per square inch for removal of very small particles.

A timed-program controller, called a Flex-O-Timer, automatically changes over from one filter to another. This instrument actuates 16 air-operated valves, two pumps and timer for cycles. It also operates precoat timer. Change from one filter to the other can be initiated by pressure differential when pressure reaches 25 psi. It takes several days to build up to this pressure except when turbidity occurs.

Each filter, in turn, is taken off line, backwashed twice and held on standby. Dome on each filter permits buildup of sufficient pressure for speedy, thorough backwashing.

A high-level control on the storage tank puts the on-line filter into recirculation if the tank level reaches a maximum point.

A flowmeter is connected with a control valve to provide a nearly constant maximum filter output within the operating range of pressure drop across the filter. As the first filter approaches backwash time, this control will gradually open the second filter to provide the maximum desired flow through the system during the switchover interval. Both filters are on stream only for a short time during this switchover period.

Results: Filter plant provides 300 gpm of crystal-clear water, helping to maintain the high quality and sparkling flavor of the two million bbl of Rheingold beer produced per year. Labor saved in less than a year has paid additional cost of making filter plant automatic.

No maintenance problems have occurred with filtration setup. Air-operated valves have been found to be reliable.

(IWF Poro-Stone filter is product of R. P. Adams Company, Inc., 225 East Park Drive, Buffalo 17, N. Y.)

Check 4269 opposite last page.

(Flexo-O-Timer is product of Taylor Instrument Companies, Rochester 1, N. Y.)

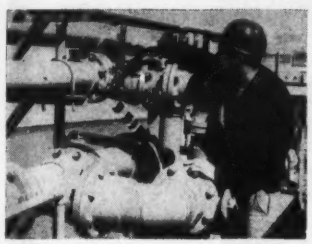
Check 4270 opposite last page.

Hot H_2SO_4 solution handled 24 hr/day by PVC pipe

Shows no sign of wear after nearly 2 yr

Corrosive liquids are being handled 24 hours a day through nearly four miles of PVC pipe at the uranium concentrating plant of Kermac Nuclear Fuels Corp., Grants, New Mexico. The pipe has shown no signs of failure due to corrosion or abrasion since the plant started in Nov. 1958.

Most of the 20,000 ft of pipe is outdoors. Sizes range from ½ to 8" diam. Pipe's smooth



Nearly four miles of PVC pipe serve uranium mill at Grants, New Mexico

interior is reported to boost flow rate by as much as 25% over conventional metal types.

At Kermac, up to 2400 gpm sulfuric acid solution and solvent mixture (consisting of kerosene and amines) are processed through PVC pipe serving thickener and extraction circuits. Product in pipe reaches up to 50 psi and 110°F. End product of plant is uranium oxide which is packaged in 55 gal drums and shipped to AEC. Rated capacity of mill is about 3300 tons per day.

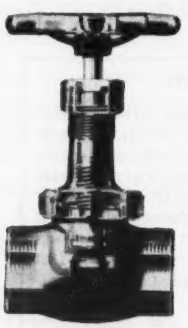
(Further information about Koroseal PVC pipe may be obtained from B. F. Goodrich Industrial Products Company, Division of B. F. Goodrich Company, Akron, Ohio.)

Check 4271 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.



The LUNKENHEIMER Valves in your *competitor's* plant are the valves that cost *you* most!



L-460-6A

With quality Lunkenheimer Valves in his plant, your competitor enjoys far fewer leakage, production and maintenance losses. Thanks to these savings, he lowers his manufacturing costs . . . and makes more profit. Why give him this important advantage? Install Lunkenheimer Valves . . . famous for quality and performance for nearly a century. The Lunkenheimer Co., Cincinnati 14, Ohio.

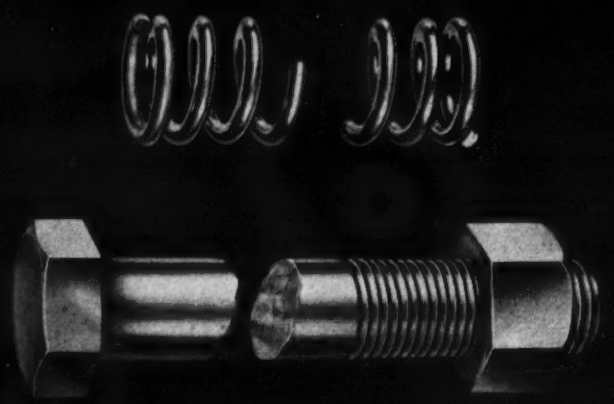
You can't find the cost of a valve on a price list.

• BRONZE
• IRON
• STEEL
• PVC

LUNKENHEIMER®
THE ONE *Great* NAME IN VALVES

Check 4272 opposite last page.

Are broken springs,
broken bolts,
or valve noises giving you
COMPRESSOR HEADACHES?



here's why the simple design of the air cushion valve makes PENNSYLVANIA COMPRESSORS run efficiently...silently...with minimum maintenance.

Stainless steel valve discs lift against a cushion of air in the simple, efficient design of the Air Cushion Valve that makes PENNSYLVANIA Compressors run so silently, so dependably, and with such low maintenance requirements. Air Cushion Valves have no nuts, bolts, or screws to break or burn fast. You get longer valve life . . . eliminate wear . . . eliminate noise caused by metal striking metal. Flat valve discs have no flexing or bending action to weaken or distort them. And the valve springs are highest grade stainless steel, rolled on edge, insuring maximum strength and durability. There is just one spring for each disc, and it bears evenly on the entire surface.

But this is only part of the PENNSYLVANIA story. Learn all the facts in "Compressors for Industry". It describes PENNSYLVANIA Compressors from 10 to 350 hp, horizontal, angle, and OILFRE models. Write to Dept. C-8 for your copy today.

PENNSYLVANIA
PUMP AND COMPRESSOR COMPANY
Easton, Pa. • Earning Customer Confidence Since 1920



Check 4273 opposite last page.

NEW SOLUTIONS

PVC pipe pays off in tough service

Handles variety of acids at Memphis plant

Velsicol Chemical Company reports that it is getting satisfactory service from PVC pipe in severe corrosive applications.

For example, at its Memphis, Tennessee plant, a total of 741 ft of 1 to 2" PVC pipe was used during 1959. Majority of it is handling muriatic acid at ambient temperatures, 20 and 50% acetic acid at 60 to 130°F, 10% sodium hypochlorite at 75 to 100°F, weak HCl vapor systems at 60 to 100°F, and limited usage in chlorine water service and water at 70 to 130°F.

The company says that it has been using PVC pipe since 1952 when it was first started on water service. Muriatic acid and acetic acid installations began in 1956 and 1958 respectively.

There have been little or no replacement problems. Minimum maintenance coupled with relatively low initial cost have made its selection popular for corrosive service.

Overall comment: Although screw connections have been mostly used by Velsicol, cemented connections are preferred because they are proving to be even more trouble-free.

(Further information about PVC pipe may be obtained from National Tube Division, U. S. Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pa.)

Check 4274 opposite last page.

NEXT MONTH

New equipment often brings new headaches. Davison Chemical faced dust nuisance problem after enlarging phosphate rock drying facilities. Quick installation of factory-assembled scrubber saved the day. Used as secondary system, unit boosted overall collection efficiency from 95 to 99.6%. Bonus: Plant now gets cheers from the community. Look for the story next month.

JUSTRITE

...America's greatest name in
SAFETY CANS *and*
OILY WASTE CANS



"JUSTRITE" on a safety can or oily waste can is positive assurance of protection. Millions of these carefully designed and engineered cans are in use in thousands of plants all over the United States. Reduce fire hazards due to benzine, oily rags and waste. JUSTRITE Safety Cans are the finest cans for use for flammable or highly volatile liquids. Both types of JUSTRITE cans are Underwriters' Laboratories and insurance companies' approved.

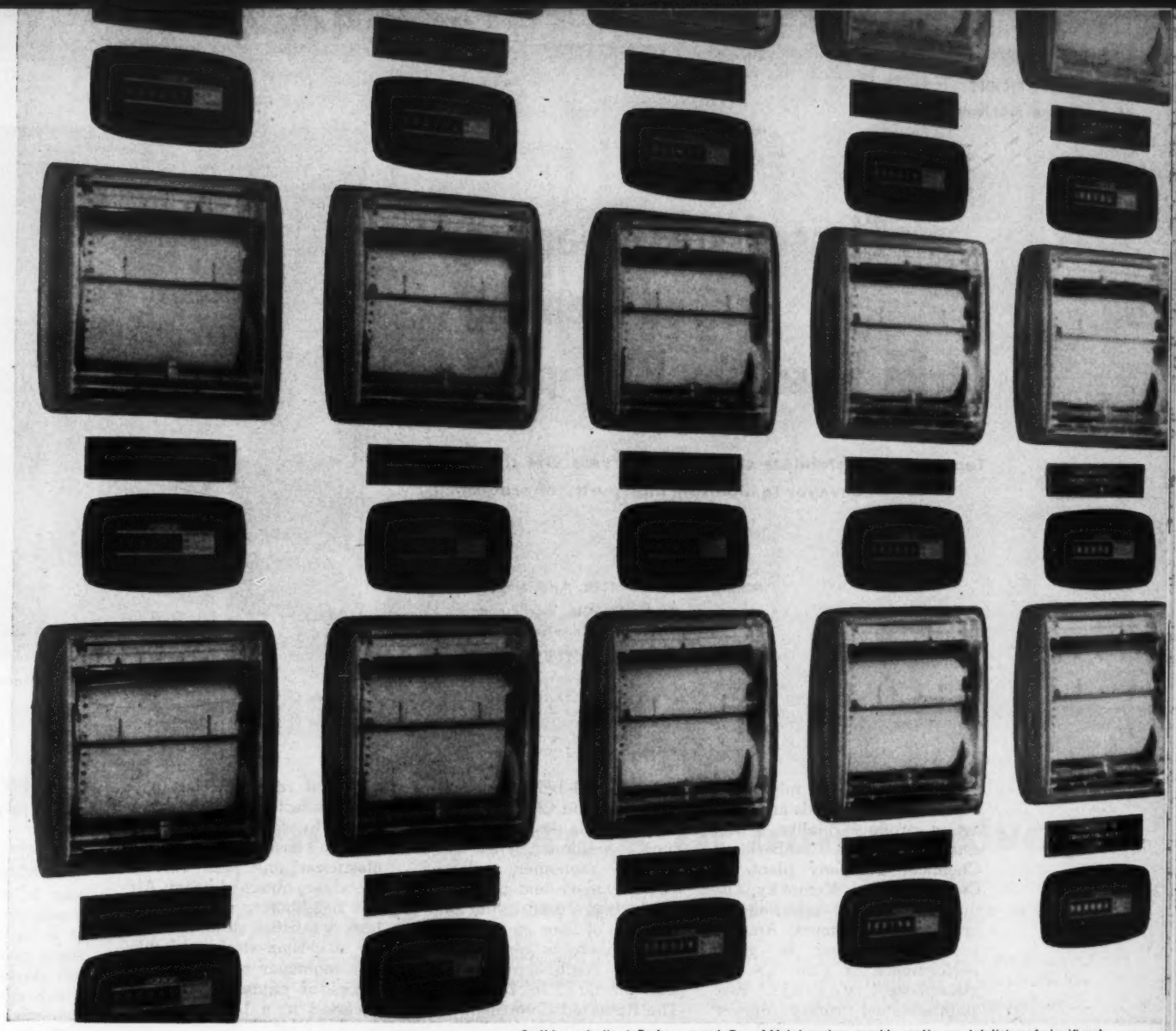


FREE!
Send today for your copy of the bulletin showing the Justrite Safety Benzine Cans, Oily Waste Cans and Plunger Cans.

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2061 NORTH SOUTHPORT AVENUE
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world's standard of safety since 1906

Check 4275 opposite last page.



On this centralized Foxboro panel, Type 14A Integrators provide continuous totalizing of significant process and plant service flows – recorders give trend records required by operating personnel.

Simplest way to get continuous, accurate totalizing

of all process and plant service flows

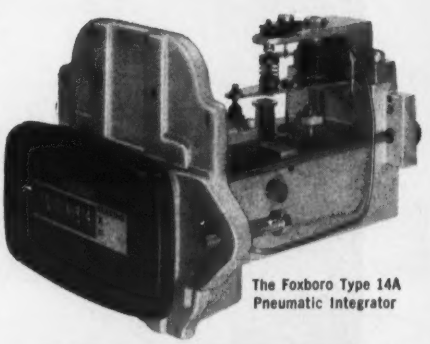
For automatic flow-accounting of all process and plant service fluids, Foxboro Type 14A Pneumatic Integrators offer unparalleled advantages of accuracy, convenience, and economy.

Easily connected to signal lines from new or existing Foxboro d/p Cell* Flow Transmitters, 14A Integrators provide **continuous** totalizing of significant flows. They can be mounted with the d/p Cell at the point of measurement, or panel-mounted hundreds of feet away.

The square root function is automatically extracted — flow totals are read directly. A simple, inherently accurate, centrifugal force system eliminates the errors of cams, special chambers, linkages, and intermittent counting.

Bulletin 13-23 fully illustrates and describes the Type 14A Pneumatic Integrator, and points the way to economical accounting of process and plant service flows. Write for your copy today. **The Foxboro Company, 819 Neponset Ave., Foxboro, Mass.**

*Reg. U.S. Pat. Off.



The Foxboro Type 14A Pneumatic Integrator

FOXBORO

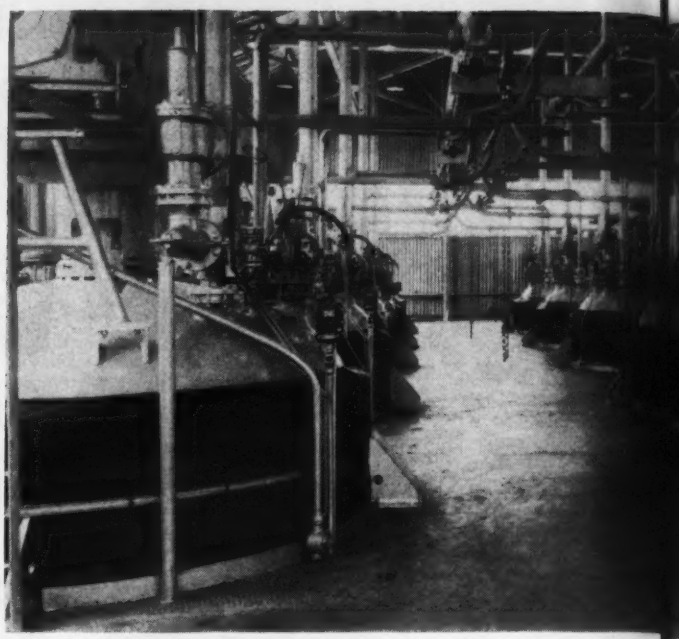
REG. U.S. PAT. OFF.

For more information on product at right, specify 4276 see information request blank opposite last page.

Glassed-steel reactors speed cleaning trim losses in PVC plant

Team up with stainless steel rotary dryers and closed conveyor to maintain high purity of product

GORDON WEYERMULLER, Associate Editor
with **R. A. WILSON,** Vice President
Air Reduction Chemical Company
Div. of Air Reduction Co., Inc.

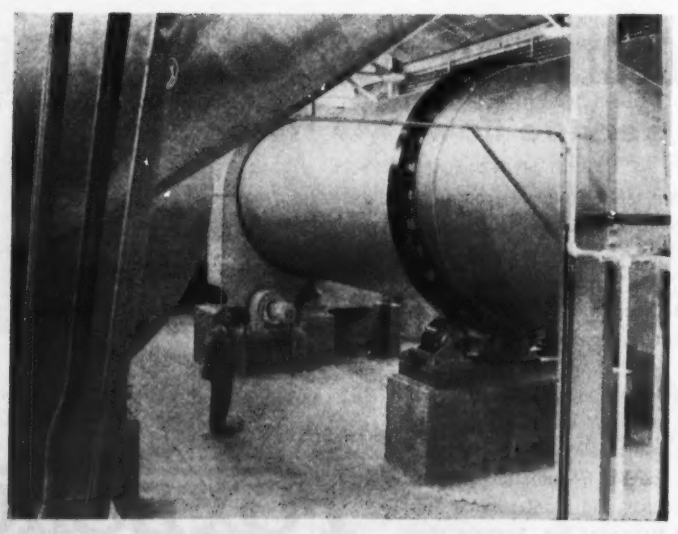


Product purity is protected by glassed-steel reactors

The record of minimum downtime, high yields and exacting product quality being established at the Cumberland Chemical Company plant in Calvert City, Kentucky, is due to prudent selection of processing equipment. Among units contributing to good performance of plant are 16 glassed-steel vessels, two stainless-steel rotary dryers and a closed-belt conveyor.

Cumberland Chemical Company plant is designed to produce 50 million lb/yr of vinyl chloride monomer, polymer, copolymer and plasticizer. Products are used in the manufacture of floor and wall tile. The company is jointly owned by Air Reduction Company and Mastic Tile Division of The Ruberoid Company.

One of raw materials used in manufacturing vinyl chloride is byproduct hydrochloric acid discharged from a wax plasticizer unit. The other is acetylene obtained from Airco's neighboring plant. Acetylene is purified prior to use in the 10 carbon-steel vinyl chloride monomer reactors. These pieces of equipment are not enclosed in a building.



◀ One of the two stainless steel dryers which reduce moisture of PVC from 16 to 0.25%

Removal of panel shows closed conveyor curving upward to hopper above bagging operation ▼



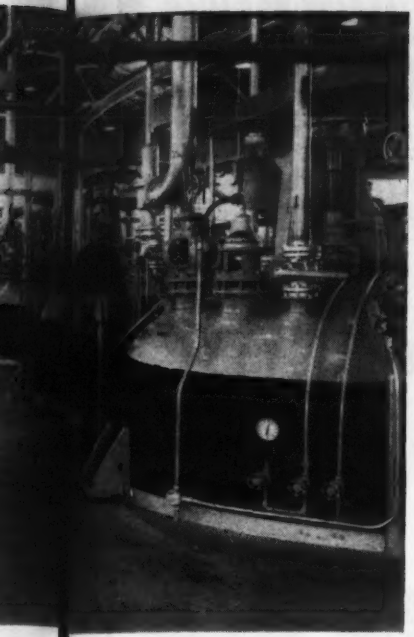
PVC Doesn't Adhere To Glassed Reactors

Vinyl chloride monomer goes to polymerization operation in next step where both copolymer and homopolymer are made. Polymerization takes place in fourteen 3700-gal glassed-steel reactors. Primary advantage obtained through use of the vessels is that the PVC does not plate out as rapidly on glass. This has minimized losses in production. Glassed vessels can be quickly cleaned between batches with spray-rinse valve.

Another advantage is that glassed steel will not contaminate or discolor materials used in making the resin. Corrosion resistance provides long service life.

One of the 14 glassed-steel reactors is equipped with a variable-speed drive, which permits experimentation on a plant scale to find most desirable operating conditions for specific products.

Unreacted monomer is removed in two 5000-gal glassed-steel strippers and product passes to centrifuges,



then to two 10′-diameter by 40′-long warm-air dryers.

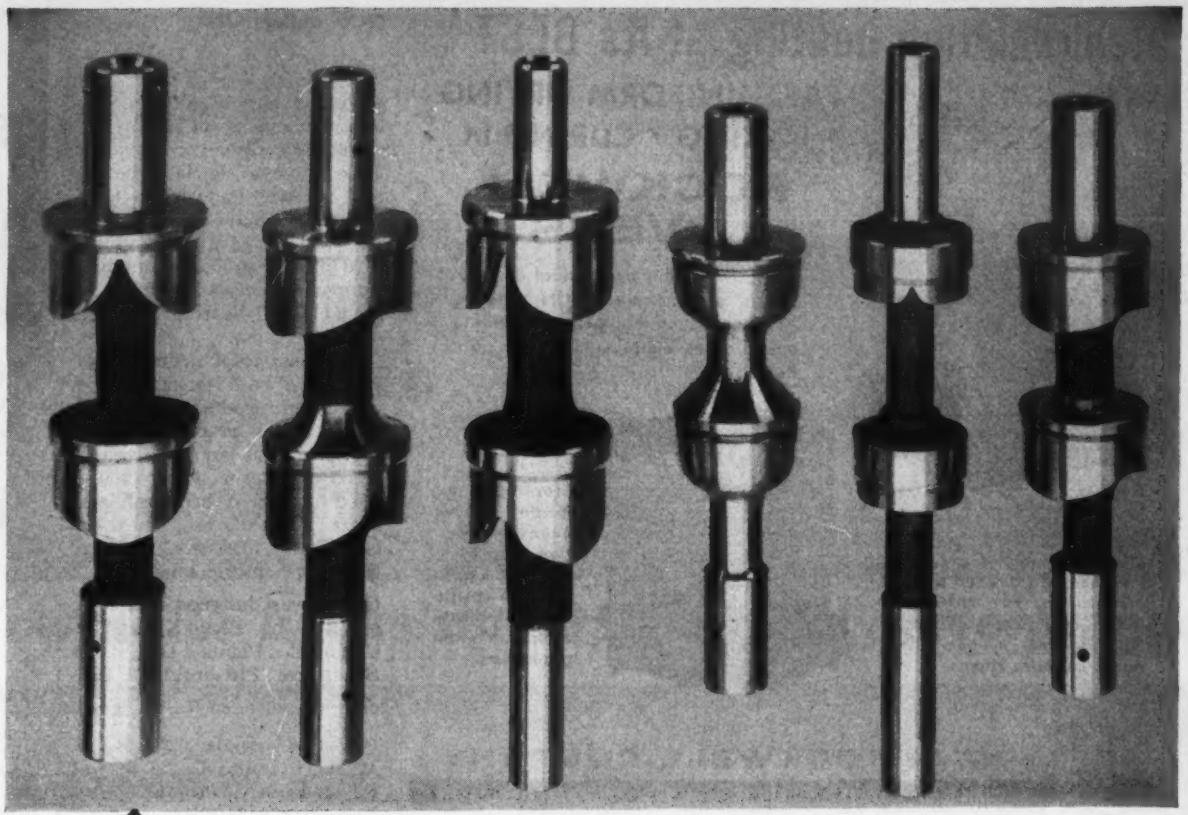
Stainless Steel Dryers Prevent Contamination

Both dryers are constructed of Type 316 stainless steel to safeguard purity of product. Dryers are designed to dry PVC from about 16% to 0.25% moisture in preparation for bagging. About 6000 lb/hr of dry product is divided equally between the two dryers. Filtered air enters dryers at 300°F. Evaporation keeps actual material temperature below its softening point of 175°F.

Flights on inside of dryer shell lift material during rotation and drop it into air stream. Each dryer rotates at about 2½ rpm. System of knockers on feed end prevents material from sticking to inside surface at that point.

Closed Belt Conveyor Bars Moisture Pickup

From dryers product passes to storage bins. From storage bins, product is transported to



Inner secrets of inner valves

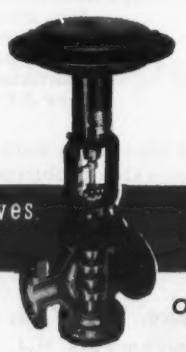
FACTS EVERY CONTROL VALVE USER SHOULD KNOW

This is a rare photograph . . . presented in a completely unretouched form. It shows the inner valve of leading makes of diaphragm control valves. The inner valve determines the control result.

The most amazing fact is the size . . . all are *listed* as two inch valves. All are high lift. But compare them.

Note the KIELEY & MUELLER inner valve at the far left. It equals the others on every point of consideration; exceeds on many. Look at the diameter across the skirt . . . that's one reason for the remarkable C_v of K&M valves. Look at skirt length; the solid, not fabricated, design. Measure the rugged guide posts and the large column. Examine the machining and the super-finishing.

It's no wonder . . . K&M is *the valve that likes to be compared.* It's a better valve and a better value by every measure of comparison.



FOR THE COMPLETE FACTS . . . write for the K&M Valve Engineering Data Catalog, Bulletin CV53.

diaphragm control valves

K&M

Our 78th Year

KIELEY & MUELLER, INCORPORATED

Oldest Pressure and Level Control Valve Manufacturer

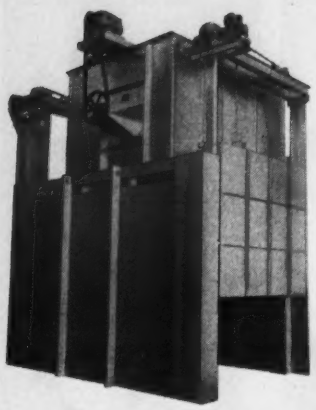
64 Genung Street, Middletown, New York

Check 4277 opposite last page.

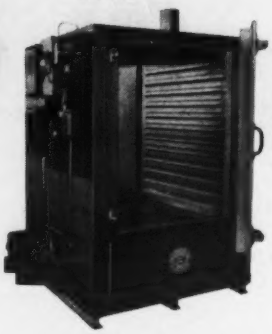
Recirculation heating at its BEST

FAST-UNIFORM DRYING BAKING • CURING in ROCKWELL OVENS

These two ovens are typical of thousands of Rockwell units serving American chemical process heating needs. Get Bulletin 127 for more details.



Truck oven, doors at both ends; for sintering ores at 1200°F. Air from external gas-fired heater is directed by recirculating fan through louvers across the work load. Stainless steel interior withstands corrosive vapors.



Electric, tray-loading cabinet oven for cross-flow heating to 500°F.; equipped with operating and safety controls. Can be gas-heated.

ROCKWELL SINCE 1888 BUILT

W. S. ROCKWELL COMPANY

FURNACES · OVENS · BURNERS · VALVES · SPECIAL MACHINERY

2200 Eliot Street • Fairfield, Conn.

Check 4278 opposite last page.

Strahman

SCORES AT MERCK CHEMICAL!



Drain Valve Installation

"The STRAHMAN DRAIN VALVE has eliminated plugging problems in draining slurries from vessels, minimized repair of glass-lined vessels, and has reduced valve replacement and maintenance."

Says **JACK McINTOSH** *—Mgr. Equipment and Construction Purchasing Department, Merck & Co., Inc.*

Let Strahman help solve *your* valve problems as it has done for thousands of others since 1920.

Write for literature

Strahman VALVES, INC.

Nicolet Ave., Florham Park, N.J.

Drain Valves • Sampling Valves • Spray Nozzles • Mixing Units • Liquid Level Gauges

Check 4279 opposite last page.

NEW SOLUTIONS

screening and bagging operation by means of a Zipper closed-belt conveyor-elevator. This conveyor is flat when it first receives material. It then curves around product and zipper closes to prevent moisture pickup or contamination. Supports consist mainly of small ball-bearing guide rollers.

Engineer-constructor had to guarantee both capacity and quality of products. Exacting specifications made construction of a pilot plant necessary. Here two resins were developed that met requirements. Plant was completed in November 1959, five months ahead of contract schedule.

(Plant was designed and constructed by Blaw-Knox Co., Chemical Plants Div., 300 Sixth Ave., Pittsburgh 22, Pa.)

Check 4280 opposite last page.

(Glasteel vessels are product of The Pfaudler Co., a div. of Pfaudler Permutit Inc., Rochester 3, N.Y.)

Check 4281 opposite last page.

(Stainless steel dryers are product of Louisville Dryer Div., General American Transportation Corporation, 135 South LaSalle St., Chicago 90, Ill.)

Check 4282 opposite last page.

(Zipper conveyor is product of Stephens-Adamson Mfg. Co., 63 Ridgeway Ave., Aurora, Ill.)

Check 4283 opposite last page.

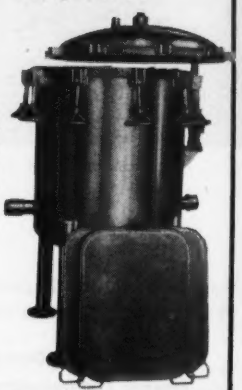


"But I thought you could get 220 v from two 110's."

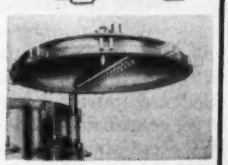
Fred W. Stennuis, Borden Chemical Co.

FOR LIQUIDS WITH A LOW PERCENTAGE OF COMPRESSIBLE SOLIDS.....

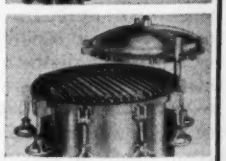
SHRIVER'S TYPE "VTVL" is the FILTER to install



Vertical tank, vertical leaf pressure filter; filter areas from 20 to 510 sq. ft.; tank diameter from 18" to 48".



Sluicing header in cover (optional) directs spray on surface of leaves to slurry cake down for removal from tank.



Showing filter leaves nested in tank.

For clarification or polishing of liquids containing a low percentage of solids, particularly if those solids may be discharged as waste, we recommend the Shriver "VTVL" Filter. It provides convenient, efficient, leakproof filtration at high, uniform rates. There is a size to meet your needs.

For dry cake discharge and for processing more concentrated slurries we recommend the "HTVL" — horizontal tank vertical leaf filter.

Write for Bulletin 146.

T. SHRIVER & CO., Inc.

846 HAMILTON ST., HARRISON, N.J.

Check 4284 opposite last page.

THAT'S INTERESTING

Weather tracing

The weatherman can expect a nuclear assist in the near future. A nuclear weather detector is being developed by Tracerlab to use radiochemical tracer techniques to track down and assess ozone clouds caused by solar radiation in the earth's atmosphere.

Weathermen believe this information will enable them to more readily predict weather patterns.

Spraying under soil

Higher weed kills are obtained with volatile herbicides by spraying underground, USDA-state tests indicate. Using a cultivator-sprayer and EPTC, researchers obtained 90% control of weeds as compared to 74% with conventional spraying.

For more information on product at right, specify 4285 see information request blank opposite last page.



Towmotor backs up outstanding performance



with Towmotor dependable service

When you purchase Towmotor equipment you can be sure it will never be out of service very long . . . for two very good reasons:

1. Towmotor fork lift trucks are built to last, and built to perform continuously.
2. When needed, you get fast and skillful repair and maintenance service from your local dependable Towmotor representative.

Your Towmotor representative will never let downtime cut into the money you *save* by owning a Towmotor fork lift truck! That's why Towmotor customers keep buying Towmotor equipment. Ask for complete information on Towmotor equipment and Towmotor Preventive Maintenance Service. Write Towmotor Corporation, Cleveland 10, Ohio.

TOWMOTOR THE ONE-MAN-GANG ® -GERLINGER

FORK LIFT TRUCKS, CARRIERS AND TRACTORS SINCE 1919

*Gerlinger Carrier Co. is a subsidiary of Towmotor Corporation

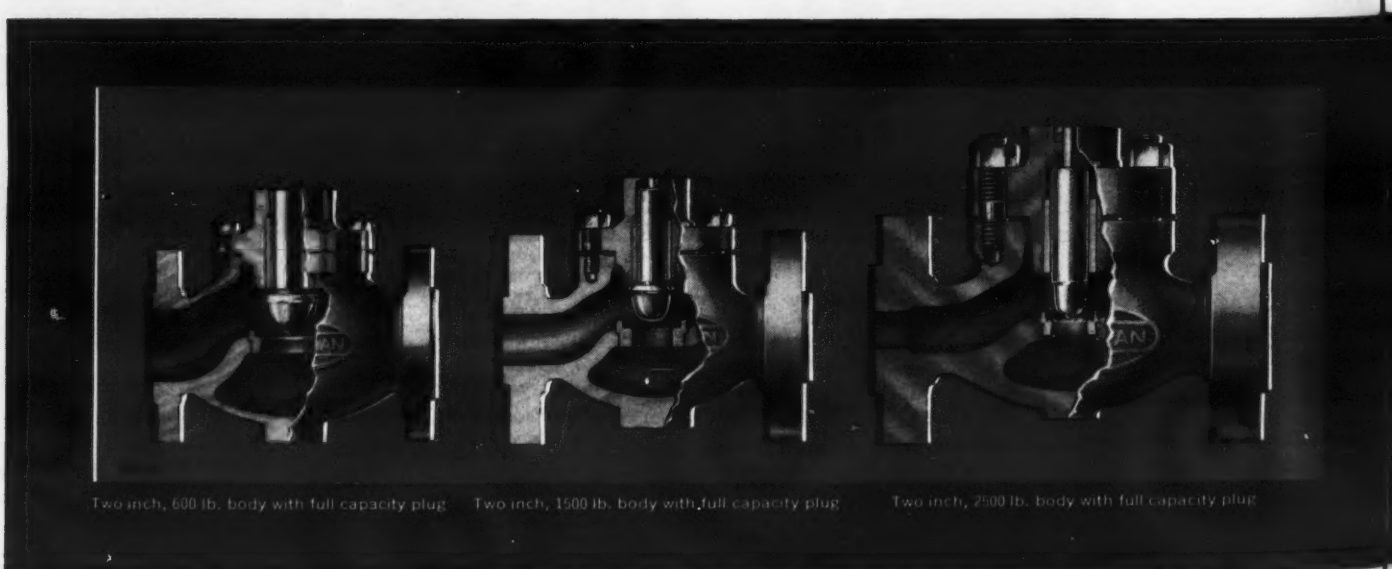
Versatility

is the word for these

SINGLE SEATED CONTROL VALVES

- **High Capacity**
- **High Allowable Pressure Drops**
- **Wide Selection of Reduced Capacity Trim**

The new line of Mason-Neilan 20000 Series Control Valves provides the most versatile single seat design available. They have an unusual combination of premium features that suit them for a wide range of applications, including viscous fluids and slurries.



Two inch, 600 lb. body with full capacity plug Two inch, 1500 lb. body with full capacity plug Two inch, 2500 lb. body with full capacity plug

See Masoneilan Exhibit at the

High Capacity . . . top guiding, unrestricted seat ring area, body and plug contours provide greater capacity than most top-and-bottom-guided double seated valves of comparable sizes.

High Pressures and Pressure Drops . . . high capacity is attained with minimum seat ring areas, resulting in less unbalance force, permitting higher pressure drops. Heavy guiding throughout full stroke results in a minimum of unsupported plug length and allows high pressure and high pressure drop applications without lateral vibration. Generous guide surfaces and large plug stems are sized in accordance with body rating.

Soft Seat Trim . . . available in Teflon and Buna-N. Suitable for static pressures and pressure drops up to 500 psi.

Wide Selection of Reduced Capacity Trim . . . for those applications where velocity due to high drop is a consideration (or where future requirements for larger capacity are a factor) a wide selection of reduced capacity trim is available — and interchangeable in comparable valve sizes and ratings (see table). The proper relationship between stroke and trim size is maintained in order to provide the strongest possible plug tip, particularly in hard, brittle materials.

Wide Selection of Materials . . . the design of body and plug permits the use of suitable special materials to meet severe operating conditions.

Suitable for Slurries . . . body and plug contours (plus the fact that no bottom guiding is required) make these valves suitable for viscous fluids and slurries.

Welding Ends Available . . . the solid-cast body allows the use of welding ends. The removable bolted bonnet permits easy (only one joint to break) inspection or cleaning with valve in the line.

Actuators Sized to Body Rating . . . the standard spring-diaphragm (direct or reverse) actuator is sized according to body rating, thus minimizing requirements for oversize actuators in severe applications.

These 20000 Series are economical to buy and operate. Look into these many advantages; send for complete details or contact your local Mason-Neilan representative.

MASONEILAN

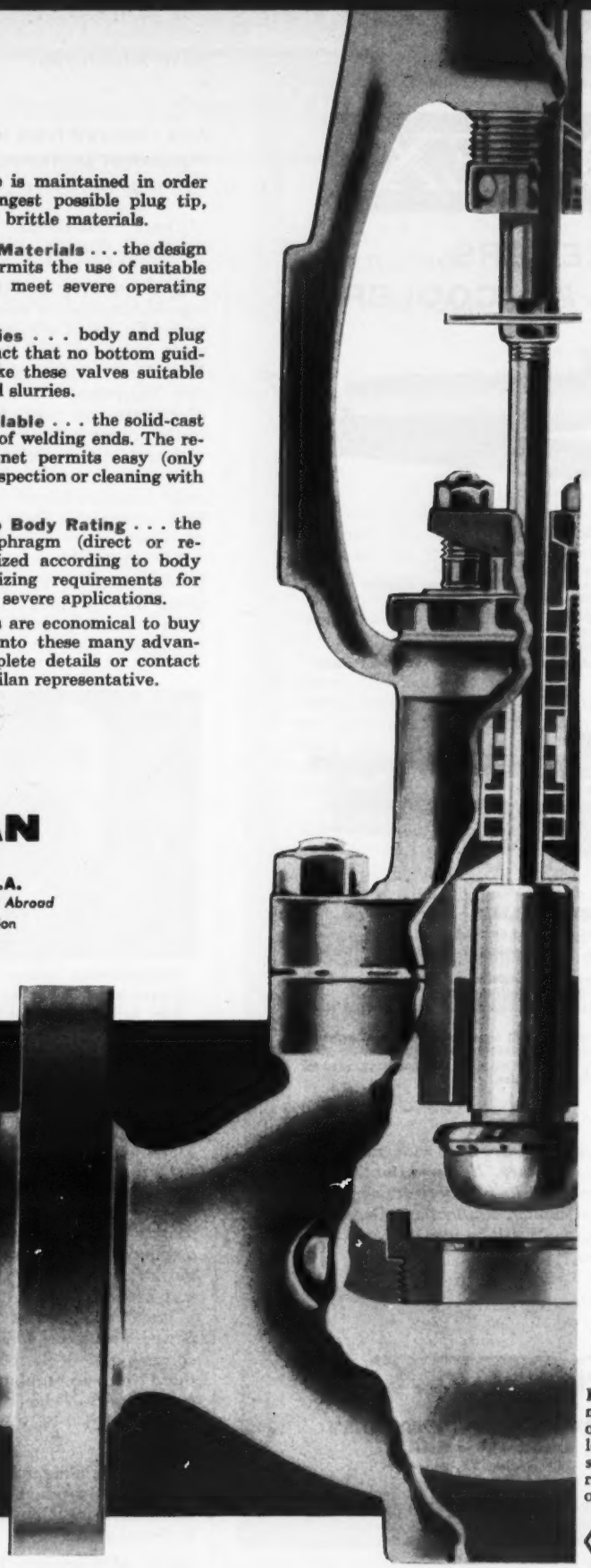
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Available Cv Ratings

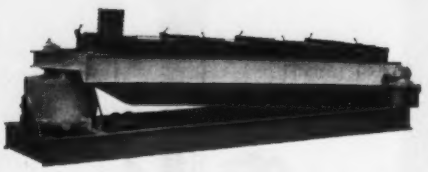
Valve Size	NOMINAL TRIM SIZE											
	¼"	⅜"	½"	¾"	1"	1½"	2"	3"	4"	6"	8"	10"
¾"	1.5	3.4	5.2	8								
1"	1.5	3.4	5.2	10.8	12							
1½"	1.5	3.4	5.2	12	14	25						
2"	1.5	3.4	5.2	12	18	25	46					
3"				12		25	46	110				
4"						25	46	110	195			
6"							46	110	195	400		
8"								110	195	400	640	
10"									195	400	640	1000

For more information on product at left, specify 4455 see information request blank opposite last page.

I.S.A. Show, Booth 1412

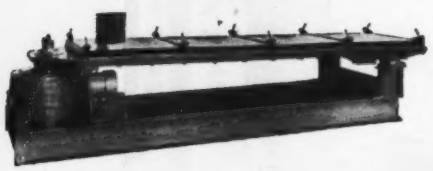
ROTEX®

SCREENERS
and New Rotex COOLERS



ROTEX SCREENERS

- Completely enclosed and dust tight.
- Quiet running, counterbalanced drive.
- Horizontal gyratory motion gives clean, accurate separations and high capacity.
- Heavy welded, steel construction.
- Low head room and fast screen changes.
- ROTEX Ball cleaners prevent screen blinding.
- Over 30 standard models with from 1 to 5 screen surfaces



***NEW* ROTEX COOLERS**

- Completely enclosed and dust tight.
- Well known, quiet running, counterbalanced ROTEX drive.
- Horizontal gyratory rotation keeps material in constant contact with entire cooling surface.
- Heavy, welded, steel construction with stainless steel interiors.
- Accessible interiors with rounded corners and smooth, polished surfaces to meet sanitary standards.
- High cooling efficiency in a low cost, sanitary, easy to clean production cooler.

●

ROTEX Screeners have been widely used for nearly half a century. Now we offer the new ROTEX Cooler. Write for information on your screening or cooling application. Our experienced engineers will be pleased to cooperate with you.

●

ROTEX®

THE ORVILLE SIMPSON COMPANY
1246 Knowlton Street
Cincinnati 23, Ohio

Check 4290 opposite last page.

NEW SOLUTIONS

Iron removed from ink; equipment protected by magnetic traps

Check ball-milled product prior to filtering

Product purity and processing equipment are being protected by use of efficient magnetic traps at the Secaucus, New Jersey plant of Sinclair and Valentine, manufacturers of rotogravure inks. Installed in line running from ball mills to mobile filter unit, two non-electric traps remove fine ferrous contamination resulting from attrition of steel balls in the mills.

In addition to guarding product purity, the magnetic units prevent metal particles from reaching and possibly damaging the filter's pump.



Magnetic traps (arrows) are arranged in tandem in line running from ball mills to mobile filtration unit

Removing these particles also minimizes blinding of the fine filter medium used.

The non-electric traps consist of permanent rods suspended in a casing. Liquid passing between and around rods is exposed to overlapping magnetic fields. Ferrous particles are instantly captured and securely held.

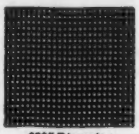
Traps require no external power source. Maintenance consists only of periodic cleaning. Iron accumulations are simply wiped clear and rods quickly placed back into service.

(Non-electric magnetic ferrous traps are product of Eriez Manufacturing Company, Erie 6, Pennsylvania.)

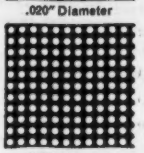
Check 4291 opposite last page.

The *Right* PATTERN
The *Right* OPEN AREA
The *Right* MATERIAL
FOR EVERY SCREENING REQUIREMENT

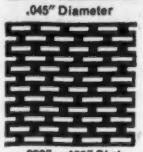
H&K PERFORATED SCREENS



.020" Diameter



.045" Diameter



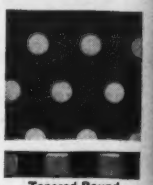
.028" x .125" Slot

Just a few of the many H&K patterns are illustrated

For grading, sieving, dewatering, filtering, straining—when you want a screen "just right" for the job—you can depend on H & K.

H & K screens are made to your order, with holes accurate and uniform in size, shape and spacing. Burr-free holes are slightly larger at bottom—reduce blinding, save on down time. Margins and unperforated areas are furnished as specified.

Screens are made in practically any material desired... including plastic. H & K specializes in perforating stainless steel, monel and other corrosion-resistant alloys. Let us work with you on your screening requirements.



Tapered Round Holes in Steel



No. 3 Diagonal Slot

FIND NEAREST H&K AGENT in the 'Yellow Pages'

Listed Under "Perforated Metals"

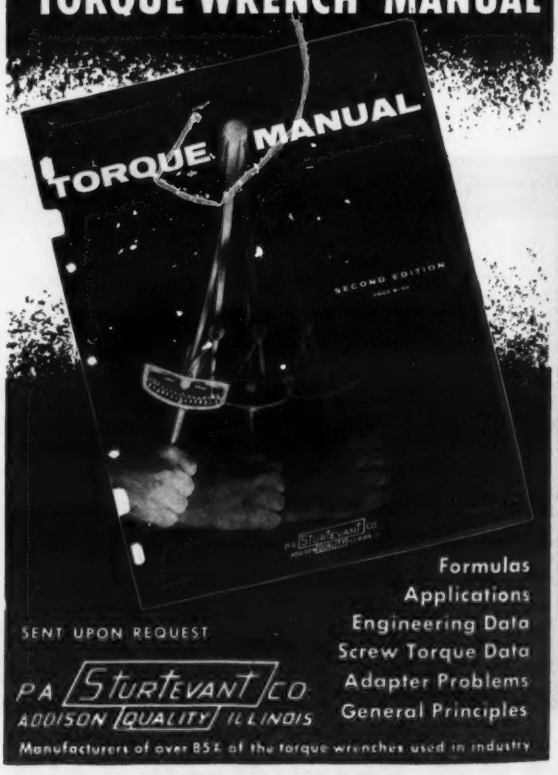
Write for H&K General Catalog

THE Harrington & King PERFORATING CO. INC.

Chicago Office and Warehouse | *New York Office and Warehouse*
5636 Fillmore St., Chicago 44 | 110 Liberty St., New York, N. Y.

Check 4292 opposite last page.

"TORQUE WRENCH" MANUAL



SENT UPON REQUEST

Formulas
Applications
Engineering Data
Screw Torque Data
Adapter Problems
General Principles

PA STURTEVANT CO. ADDISON QUALITY ILLINOIS

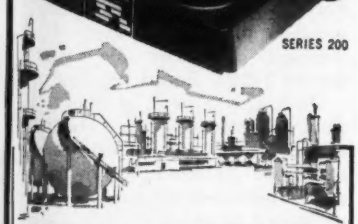
Manufacturers of over 85% of the torque wrenches used in industry

Check 4293 opposite last page.

ACCURATE CHEMICAL FEEDING

FROM .65 gph TO 1624 gph





AMERICAN PROPORTIONING PUMPS have repetitive metering accuracy of ± 1% when operating between 10% and 100% of capacity. Feed precisely metered fluids or slurries in all ratios, with controlled process variables.

- interchangeable liquid ends
- spherical self-aligning bearings on crank and crosshead
- crossheads of hardened and ground steel ride on cast iron
- nylon dust covers protect bearings
- NEMA frame motors
- heavy duty reducers

Send for free bulletin.

SERIES 100 Simplex models pump up to 13.10 gph at maximum pressure of 1000 psi. Duplex models double that capacity.

SERIES 200 Simplex models pump up to 812 gph at maximum pressure of 1000 psi. Duplex models double that capacity.



AMERICAN METER COMPANY
INCORPORATED ESTABLISHED 1836
pump division
13300 PHILMONT AVE., PHILADELPHIA 16, PENN.

Check 4294 opposite last page.

CUT HERE AND FILE

Cylindrical Shell Thicknesses For Unfired Pressure Vessels

MRS. P. D. SHROFF
Buena Park, Calif.

Accompanying nomograph presents a simplified method for determining required plate thickness for cylindrical pressure vessels to be designed to conform to the ASME Boiler & Pressure Vessel Code, Section VIII — "Unfired Pressure Vessels" (1959 edition). Nomograph is based on equation:

$$t = \frac{PR}{Se - 0.6P}$$

Where:

- t = minimum required thickness of sheel plates exclusive of corrosion allowance, inches
- P = design pressure, psi
- R = inside radius of shell before corrosion allowance is added, inches
- S = max allowable stress value, psi
- e = efficiency of longitudinal joint, %

Typical Example

Determine the thickness required for cylindrical-shell ID of 96″ and design pressure of 100 psi. Max allowable stress value is 15,000 psi and joint efficiency is 95%.

Join 48 on the R-Scale with 100 on the P-Scale to intersect t_1-Scale. From this point join 15,000 psi on the S-Scale to intersect the t_2-Scale. Now join this intersection with 95 on e-Scale and read value on t_1-Scale between 5/16″ and 3/8″. Use larger value of 3/8″ for shell thickness.

If stress value were held constant at 13,750 psi and joint efficiency at 80%, then value of thickness t may be read directly at the intersection of the t_1-Scale by the line joining R-Scale with the P-Scale. In above example for R = 48″ and P = 100 psi, required value of t = 7/16″ is obtained on the t_1-Scale for fixed stress value of 13,750 and joint efficiency of 80%.

The t_2-Scale gives required value for variable values of R, P and S and fixed value of 80% for joint efficiency. In above example for R = 48″, P = 100 psi and S = 15,000 psi, value of t on t_2-Scale between 3/8″ and 7/16″ is obtained for joint-efficiency value of 80%.

nomograph on page 65

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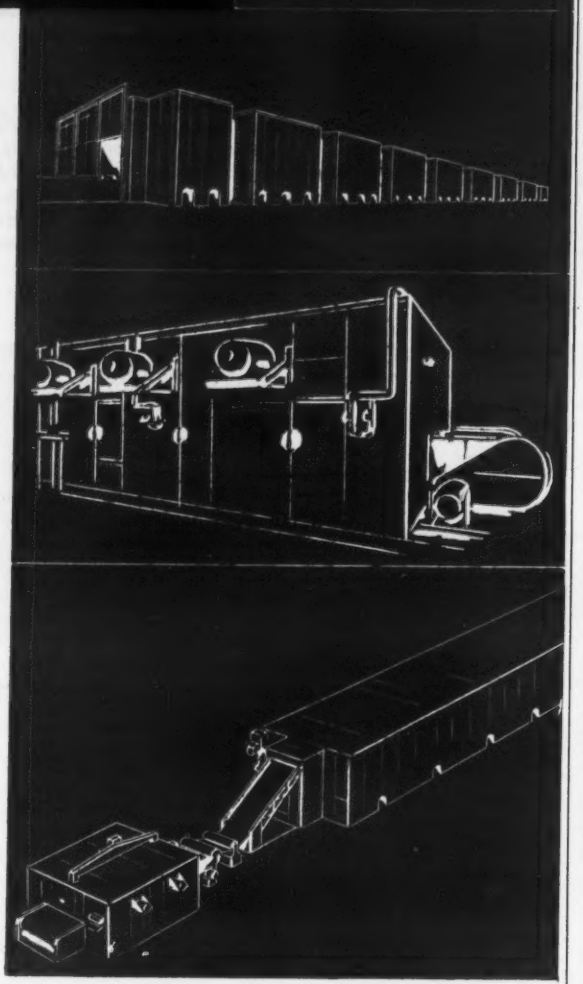
No matter what your product may be, it can be dried or otherwise processed at a lower cost per pound or other unit, in one or more of the various types of "NATIONAL" equipment.

High-speed production; maximum effective use of the drying medium under finely adjusted control; adaptability to existing plant conditions and future expansion; and the assurance of long, trouble-free operation are among the important reasons why "NATIONAL" machines are being erected in more and more chemical plants throughout the United States and in other countries.

"P-4" CONSTRUCTION. The result of a radically new approach to simplified Dryer construction, "P-4" Construction provides a precision-built, prefabricated structure, with trussed-and-tensioned insulated panels. It assures a more rigid, durable machine, with installation time in your plant reduced as much as 50%.

"ADD-A-UNIT" DESIGN. This unique accomplishment of "NATIONAL" engineering provides alternatives which are both practical and economical—(1) simplification of the initial installation based on present requirements; (2) maximum adaptability to step-by-step future expansion.

OTHER SPECIAL FEATURES. Patented Super-Power Fans, made in our own shops to specifications developed through years of industrial drying experience. Patented Indexing Orifices, Turning Vanes and other devices and arrangements assure unequalled versatility and precision in air distribution and control. The heat source may be steam, gas, oil or other medium.



THE DRYING MACHINERY COMPANY
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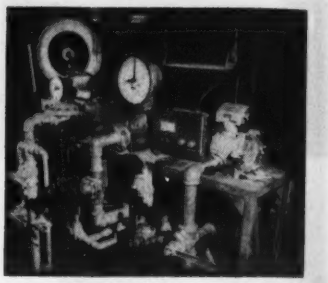
New England Agent: JONES & HUNT, INC., Gloucester, Mass.
Southern Agent: HAYES TEXTILES, INC., Spartanburg, S. C.
Cable Address: "NADRYMA"—W.U. Code

Check 4295 opposite last page.

NEW SOLUTIONS

Furnace-grade H_3PO_4 produces all liquid fertilizer formulas

Over a year's operation of a plant has shown that all liquid fertilizer formulations can be made with furnace-grade phosphoric acid. Owned by Goodpasture Grain and Milling Co. of Brownfield, Texas,



Exact formulations are assured in liquid fertilizer plant by use of this instrumentation

the plant was designed to use normal plant run, 54% wet-process phosphoric acid. It regularly produces about 25 tph of 8-24-0 liquid fertilizer.

During first year of operation, plant manufactured about 25,000 tons of liquid fertilizer formulas. Ammonium nitrate, potash and urea solutions were combined to obtain higher nitrogen contents. Only wet-process phosphoric acid was used as source of P_2O_5. Other formulas produced were 10-10-5, 4-10-10, 8-24-0 and 10-15-5.

(Fertilizer plant was built by J. C. Carlile Corporation, Denver, Colorado.)

Check 4296 opposite last page.

Reinforced polyester tanks hold formaldehyde at 90-120°F

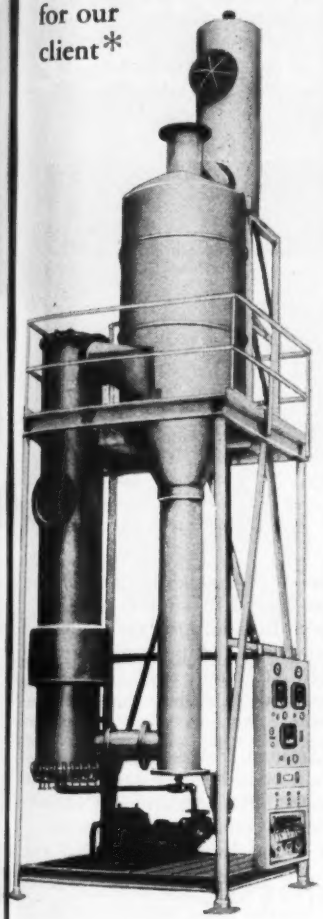
A 200,000-gallon tank coated with polyester resin has given good service in storing a 37% solution of formaldehyde at 90°F. No corrosion has occurred even at the unprotected ceiling line.

Lining was fabricated of glass cloth and Laminac polyester resin 4109, with a clear

To page 66

is EVAPORATOR

was custom-engineered to do a specific job for our client*



*Our clients tell us how they want their products. We design, build, and deliver the equipment to do the job!

THERMOVAC will custom-engineer and fabricate the processing equipment best for your job!

• Evaporators • Heat Exchangers • Process Automation • Rotary Coil and Steam Jacketed Kettles • Specialized equipment for the Food and Chemical Industries.

Write or call for immediate service; expert consultation!

Thermovac *inc.*

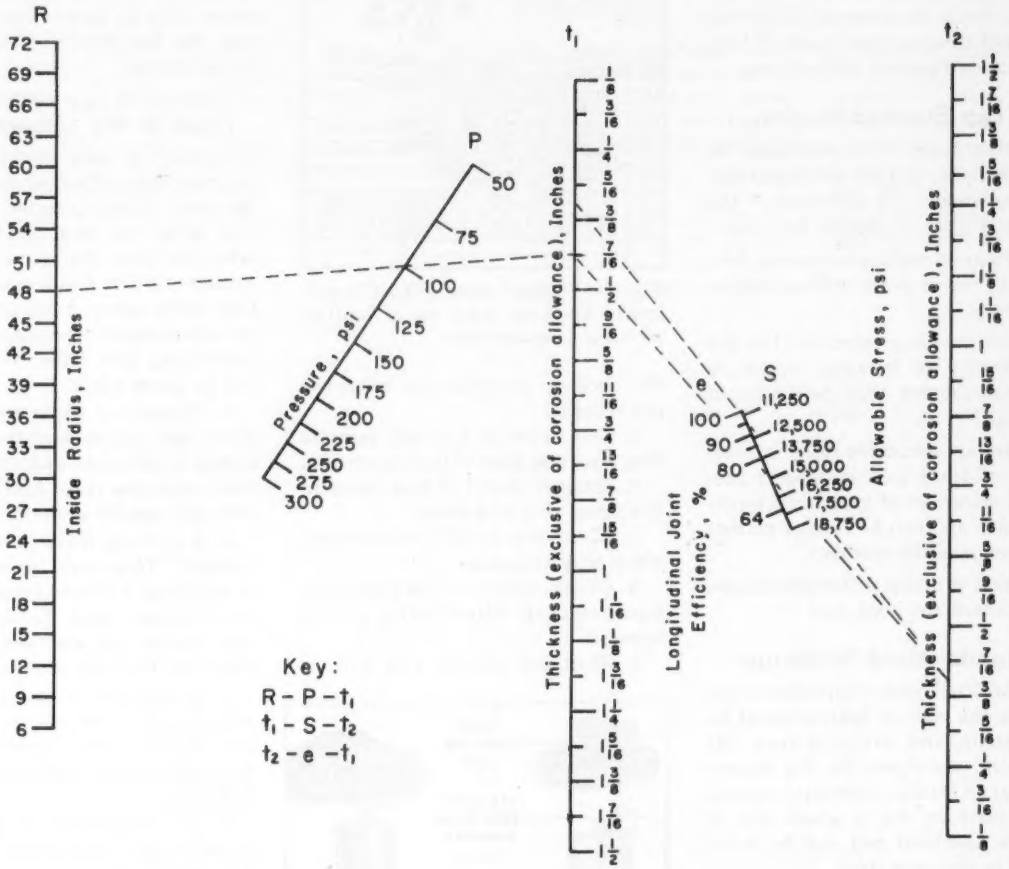
A SUBSIDIARY OF RHEEM MANUFACTURING CO.
816 East Hazelton Avenue
P.O. Box 209
Stockton, California

Check 4297 opposite last page.

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from page 63

Cylindrical Shell Thicknesses For Unfired Pressure Vessels



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Trapping Standardization

. . . steam trap standardization plus standardized hook-ups spell lower maintenance costs

An important weapon in the fight against rising maintenance costs is standardization. It can reduce the variety of maintenance problems and simplify those which remain.

Since we specialize in steam traps we'd like to offer some suggestions for a trapping standardization program. Such a program involves standardization on one make of trap and standardization of hook-ups.

Trap Standardization

The advantages of standardizing on a single make of trap are important and can make a big difference in the cost and ease of repairs because—

1. You can carry a more complete stock of repair parts with a smaller inventory.

2. Maintenance personnel has the opportunity to become expert on one make rather than be "jacks of all traps."

3. As an exclusive user of one make of traps you become a preferred customer of your trap representative and can be sure of getting the best possible service.

4. You can enjoy the advantages of standardized hook-ups.

Standardized Hook-ups

Standardized hook-ups facilitate and reduce the cost of both original installation and maintenance. By adopting standards for the dimensions of all fittings, including nipples, each hook-up for a given size of trap is identical and can be fabricated in the pipe shop.

Unions should be used so that when a trap needs repair, the unions can be uncoupled, the trap lifted from the line and a spare carrying identical length nipples and half unions slipped into place. In as little as a minute or two a faulty trap can be replaced. The faulty trap can go back to the storeroom for repair when convenient and then be put into stock as a spare.

Figure 1 shows a typical standardized hook-up used by a major chemical manufacturer. Note how

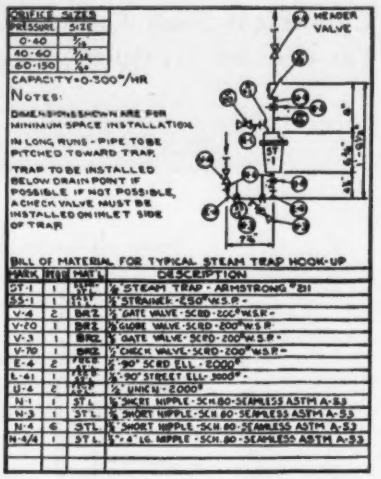


Fig. 1—Typical standardized installation hook-up used by a leading chemical manufacturer.

the hook-up provides the following advantages:

1. Test valve in trap cap permits fast, easy checking of trap operation.
2. Strainer ahead of trap protects it against dirt and scale.
3. Blowdown valve in strainer provides easy cleaning.
4. Check valve in discharge line isolates trap when test valve is opened.
5. Shut-off valves and unions ahead of and following trap permit removal of entire trap from line.



Fig. 2—Armstrong traps have only two moving parts—the lever assembly and the bucket. Nothing much to go wrong here.

Another important consideration for getting the most from a standardization program is accessibility of the traps. Insofar as is possible, traps should be located so that they are convenient for inspection. The easier it is to locate and get at a trap, the less likelihood that it will be overlooked.

What Make of Trap? (This is the Commercial)

Obviously, a trap standardization program shows the best results when the make of trap selected is the one that gives the best service. Naturally, we think the make should be Armstrong and fortunately a lot of trap users agree. Here are some of the advantages of standardizing on Armstrong that have been pointed out by these users:

1. *Armstrong traps work.* They don't leak steam and they do discharge condensate and air as fast as they reach the trap. And they work with any return system.

2. *Armstrong traps aren't "prima donnas."* They need no special care or coddling. Valve and seat are hardened chrome steel. Lever assembly and bucket are stainless steel and these are the only moving parts.

3. *Armstrong traps aren't "orphans."* You can *always* get parts and service from nearby Factory Representatives and stocking distributors.

4. *Armstrong traps are guaranteed.* If you're not *completely* satisfied you can return the traps for refund of purchase price.

More Information

The 44-page Steam Trap Book (free on request) gives a lot more facts on trap selection and installation. Call your local Armstrong Representative or write **Armstrong Machine Works, 8809 Maple St., Three Rivers, Michigan.**

ARMSTRONG STEAM TRAPS

Check 4298 opposite last page.

NEW SOLUTIONS

From page 64

finish coat of Laminac resin 4111. It was installed on May 20, 1957. It replaced another type of lining, the service life of which had been shortened to a point where the underlying concrete was deteriorating and contaminating and discoloring the formaldehyde.

Starting December 20, 1958, 200,000 gallons of 44% solution of formaldehyde at 120°F was placed in another similar tank. In addition, the ceiling was coated to prevent corrosion. After one year, this second tank is still in good condition.



One of tanks lined with polyester resin to make it withstand corrosion

(Laminac Polyester Resins are product of Plastics and Resins Div., American Cyanamid Company, 30 Rockefeller Plaza, New York 20, N.Y.)

Check 4299 opposite last page.

WANTED: NOMOGRAPHS — WORTH $20 EACH!

Do you have a pet nomograph that could save time for other CHEMICAL PROCESSING readers? If so, send it neatly and accurately drawn, with a double spaced, typewritten description to:

Data Editor
CHEMICAL PROCESSING
111 E. Delaware Place
Chicago 11, Illinois

We will pay $20 for each one accepted and published.

DEPENDABLE
VALVES for TIGHT SEALING
in those
TOUGH PROCESS APPLICATIONS



PENTON COATED DIAPHRAGM VALVE

This valve uses a rubber diaphragm to seal the fluid in valve body and a rubber covered disc to close the valve tight. Penton coating of body provides protection against corrosive action. Valve has high capacity—low pressure drop. Available in ½" to 6" sizes; manual or mechanical operators. Air diaphragm operated unit shown here. Write for Bulletin 800C.



ALL PLASTIC FULL FLOW VALVE

Valve with body in wide choice of plastics. Soft rubber or elastomer plunger seals off fluid flow. Full straight-thru design, with no obstructions or reduction in cross section area when full open, minimizes pressure loss. Sizes 1" to 2". Write for Bulletin 802D

W. S. ROCKWELL CO.
2200 Eliot St., Fairfield, Conn.

Check 4300 opposite last page.

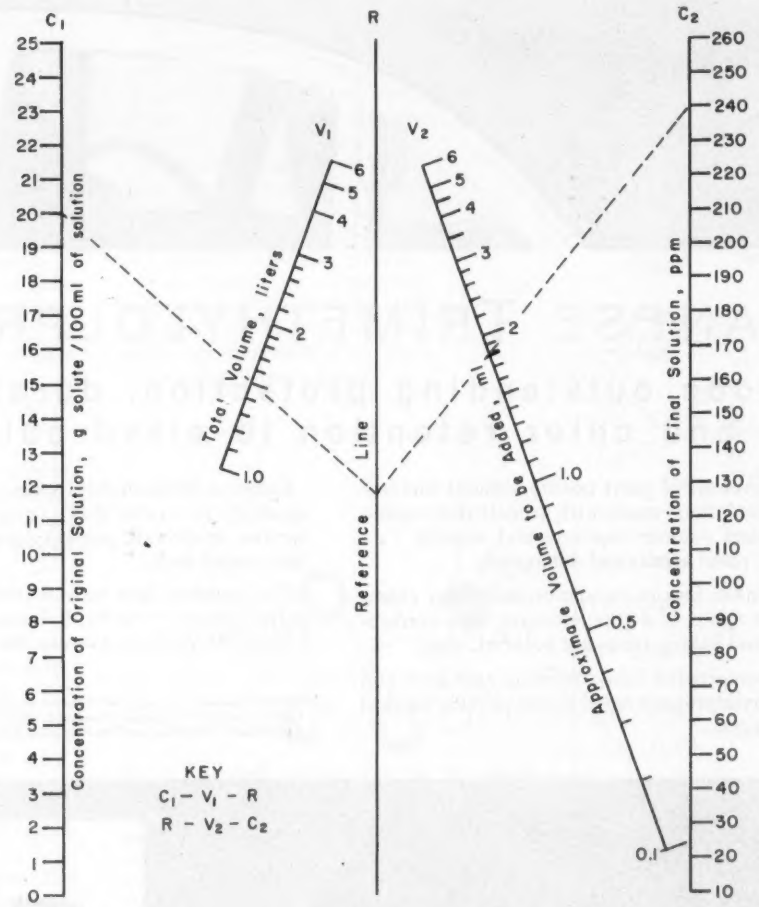
Dilution Nomograph

IRWIN COOPER
Research Laboratory Best Foods
Division of Corn Products Company, Bayonne, N.J.

This nomograph offers a convenient and rapid method of determining approximate volume of solution of given concentration that must be added to known volume of water to give final solution (specific gravity approximately 1.0) of a desired concentration. Since it is convenient to refer to dilute solutions in terms of ppm, C_2-Scale is graduated in this manner.

Typical Example: Approximately how many milliliters of a solution that contains 20g solute per 100 ml solution must be added to 1.5 liters of water to give a final solution of concentration equal to 240 ppm?

Draw straight line extending from 20 on the C_1-Scale to 1.5 on the V_1-Scale. Extend it to Reference Line. From this point, draw straight line to 240 on the C_2-Scale. Line intersects at 1.8 ml on V_2-Scale. This is approximate volume that will satisfy conditions.



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CELANESE TRIMETHYLOLPROPANE

adds outstanding protection, durability and color retention to alkyd paints

Here's how to improve alkyd paint quality without increasing cost. Paint formulations made with trimethylolpropane based resins withstand outdoor exposure and weather . . . adhere strongly . . . resist alkalis and detergents.

They impart hardness, impact resistance, and color retention on overbake or aging, to a greater degree than conventional alkyds. Dry and baking times are reduced, too.

Thus, in highly competitive fields, such as appliance and automotive, trimethylolpropane based resins provide marked competitive advantages.

Celanese Trimethylolpropane is promptly available in any quantity, at a price that's competitive. It is shipped in protective, multi-wall, polyethylene-coated aluminum foil-lined heat-sealed bags.

For complete data on how trimethylolpropane can improve paints, please write to: Celanese Chemical Company, Dept. 591-S, 180 Madison Avenue, New York 16. Celanese®

Celanese Chemical Company is a Division of Celanese Corporation of America.
Canadian Affiliate: Canadian Chemical Company, Limited, Montreal, Toronto, Vancouver.
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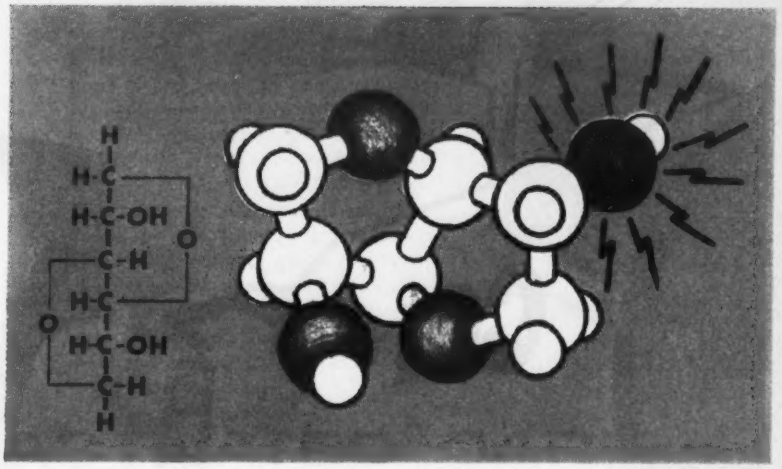
Celanese CHEMICALS

For more information on product at left, specify 4301 see information request blank opposite last page.

In the case of chemical raw materials, how many promising ones do we really recognize? Here is an example of a product that has been available for years with little interest shown by product development people in the flat, two-dimensional structural diagrams used in the past. Now, with three-dimensional explanation and interpretation, Atlas Powder Company commercially launches . . .

Isosorbide

the new raw material of 'convertible reactivity'



As told to **JOHN MELLECKER**

Recent advances in the process for production of isosorbide, centering around isolation and purification of the material as produced by catalytic removal of two molecules of HOH from corn-sugar-derived sorbitol, makes commercially available an intermediate raw material that may find a number of large-scale uses.

Already seen as a promising humectant and plasticizer, isosorbide shows greatest promise when its fundamental properties are employed in the creation of other molecules.

Isosorbide's ring structure imparts resistance to high temperatures. Its two ether-oxygens should impart greater polarity and water tolerance to polymers derived from it.

Why Convertible Reactivity?

Most important, however, is the different space configuration of the two hydroxyl groups in the "open book" fused ring structure. With one -OH sticking out (exo) from the structure and the other -OH nested (endo) in the V-fold of the rings, the exposed -OH is more readily reacted with than is the sheltered one.

Reaction can be exclusively with the exo -OH if temperature and other driving forces are restrained. If these conditions are increased in level, reaction takes place uniformly with both exo and endo hydroxyls.

Besides the primary exo-endo isomer, the other two can be produced. Dehydration of mannitol (an isomer of sorbitol), by removal of two HOH's, results in endo-endo. The exo-exo isomer is produced by two-HOH dehydrolysis of iditol, a rare polyol now catalytically produced by Atlas.

Endo-endo is currently an oddity, as such can be further dehydrated (one HOH) to produce a "cage" molecule which might have molecular sieve qualities.

It is fortunate that isosorbide (exo-endo) can be reacted the same as the exo-exo isomer, and so the latter is not needed.

Products of Reaction

Isosorbide produces unsymmetrical as well as symmetrical ethers, esters, and other compounds, which possess unusual qualities related to the presence of the fused tetrahydrofurane ring nucleus.

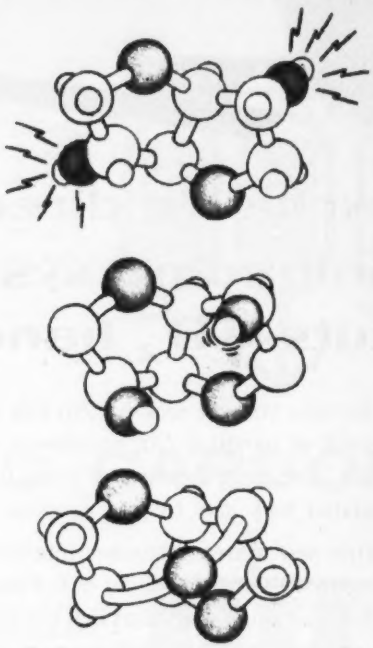
For example, ethers are generally high-boiling liquids which remain fluid at extremely low temperatures. The dimethyl ether derivative of isosorbide is soluble in both water and benzol. As "R" chains lengthen, solubility in organic solvents increases.

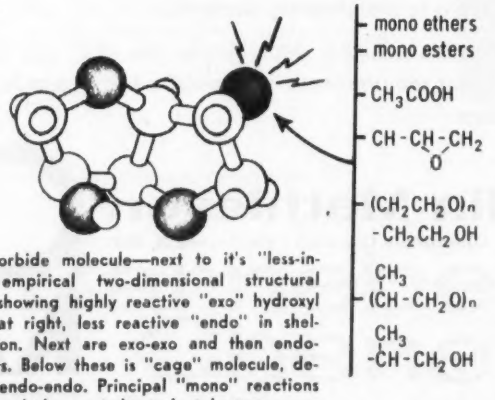
Epoxidized symmetrical fatty acid esters of isosorbide produce PVC plasticizers which impart high-temperature stability to wire coatings.

Di simple esters are lubricants of high thermal stability. As such, distearates have a leaflet structure with lubricating properties akin to graphite!

Substitution of symmetrically-reacted isosorbide for bisphenol-A in the reaction with epichlorohydrin to produce epoxy resins produces a

To page 73





Top is isosorbide molecule—next to it's "less-interesting" empirical two-dimensional structural diagram —showing highly reactive "exo" hydroxyl group out at right, less reactive "endo" in sheltered position. Next are exo-exo and then endo-endo isomers. Below these is "cage" molecule, derived from endo-endo. Principal "mono" reactions of isosorbide are indicated at bottom.



exclusive direct unloading system cuts CO_2 handling costs

To be sure you get rock bottom CO_2 costs, investigate this exclusive method of handling CO_2 shipments. It's Olin Mathieson's patented Direct Unloading System in which CO_2 flows directly from special insulated tank cars to your process.

This new system bypasses intermediate steps such as storage in refrigerated tanks, handling of cylinders, or converting dry ice, along with the expensive facilities that are required. Maintenance and upkeep are reduced, valuable plant space or land is reclaimed, and a constant supply of CO_2 is available to match every demand.

If your process requires a highly dependable, low cost source of CO_2 supply, talk over your requirements with an Olin Mathieson representative soon. 7333

Olin Mathieson
Chemicals Division • Baltimore 3, Md.

CHEMICALS

Check 4302 opposite last page.



Formulations of paint based on latex X-3339 being evaluated to assure compatibility and property development with all other ingredients

Interior paint latex cuts cost/gal 8%

- **Provides superior scrub resistance**
- **Eases finished-product formulating**

Uses: Latex was specifically developed to provide improved performance and reduce manufacturing costs in interior latex paints.

Features: Unlike most styrene-butadiene latex paints manufactured today (including manufacturer's own top latex, 762 W, which was used as a comparison in performance tests) this latex (Experimental Latex X-3339) does not require a protein thickener-stabilizer. The easier-to-handle, efficient synthetic thickeners can be used exclusively. Thus, minimum bacterial protection is required and excellent package stability is attained with no viscosity drift problems.

Manufacturing costs are reduced. Paints made with this latex have improved hiding with less titanium dioxide (a relatively high-cost ingredient). Use of all-synthetic thickeners relieves formulator of need for cooking, storing and protecting protein solutions. In finished paint, large amounts of preservatives and stabilizers are unnecessary.

Latex is designed to have reduced foaming tendency and to respond more efficiently to defoamers.

Application and film properties, when compared to conventional styrene-butadiene paint systems, show improvement in a number of areas:

1—Paints have excellent leveling with synthetic thickeners, equalling or surpassing conventional

Check These Points of Comparison

- ✔ **Permits use of all-synthetic thickeners**
- ✔ **Superior hiding with equal titanium dioxide content**
- ✔ **Higher possible pigment volume concentrations**
- ✔ **Lower manufacturing costs, easier formulating**

protein thickened systems.

2—With equal quantities of titanium dioxide, paints have superior hiding, or equal hiding with less titanium dioxide.

3—Using brushing technique equivalent to that employed with conventional styrene-butadiene systems, X-3339 lays down a heavier film.

4—Paints made with this latex show excellent film properties at pigment volume concentrations as high as 50-60%.

5—Improved wet adhesion is evidenced (preliminary tests indicate increased scrub resistance of 200 to 300% over conventional systems).

In addition, latex has low polymer specific gravity and is compatible with a wide range of modifiers.

Description: Experimental latex X-3339 is a modified styrene-butadiene latex which forms a clear, continuous, flexible, slightly tacky deposited film. It is supplied at a minimum solids content of 45% and specific gravity of 1.01 at 25°C. Brookfield viscosity is 200-250 cps and pH approxi-

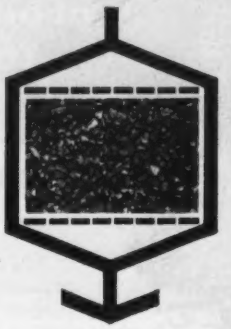
Typical Interior Latex Paint Formulations

Pigment Dispersion	Latex 762 W (lb/100 gal approx)	X-3339 (lb/100 gal approx)
Water	190	170
Pigment dispersant (25%)	6	6
Titanium dioxide, rutile	200	170
Clay	140	110
Calcium carbonate	140	150
Preservative	—	2
Casein solution (15%)	30	—
Antifoamer	4	1
Paint Reduction		
Antifoamer	3	3
Carboxymethylcellulose	40	—
Casein solution (15%)	50	—
Ethylene glycol	15	15
Latex X-3339 (45%)		320
Latex 762 W (48%)	325	—
Dowicides	30	—
Methocel		180
Non-ionic surface active agent	4	4
Viscosity adjusting agent	as required	
NH_4OH (28%)	as required	
	1177	1131
RAW MATERIAL COST/GAL	$1.17	$1.08

In these formulations, approximately equivalent hiding was used as a property control. Formulation utilizing X-3339 exhibited superior scrub resistance.

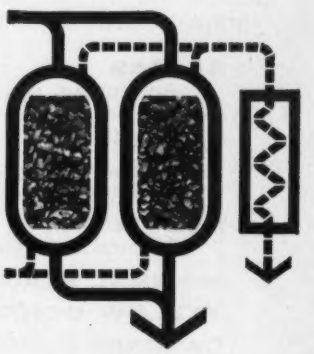
ACTIVATED CARBON

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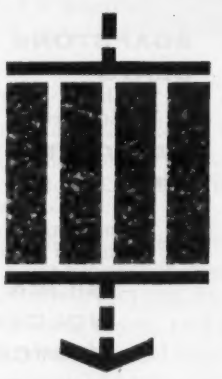
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Write for Literature Group J-46.

Barnebey Cheney

Check 4303 opposite last page.



For half a century we have had the privilege of providing basic ingredients to industry. While we welcome new customers, the great bulk of our business comes from accounts who have been on our books as long as two generations. Tight quality control is a tradition with Tamms, and this policy insures uniformity of product, a safeguard for the quality of your products or processes. We will be delighted to send samples, specifications, and prices.

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Check 4304 opposite last page.

mately 9.5.

In tests on hiding power, X-3339 was compared to manufacturer's own latex 762 W in identical formulations. Hiding was evaluated by measuring percent reflectance of coating over black surface at spreading rate of 600 ft^2/gal. Approximately 3.0 lb/gal of rutile titanium dioxide were required with conventional latex to obtain equivalent hiding to that attained with 2.5 lb/gal in X-3339.

Latex is designed to accept universal tube colors with ease. It is unnecessary to add large amounts of auxiliary wetting agents.

(Experimental Latex X-3339 is a product of Dow Chemical Co., Midland, Mich.)

Check 4305 opposite last page.

Room temperature cure, broad flexibility offered by epoxy hardener duo

Uses: Applications for these hardeners include casting, potting, encapsulating, patching compounds or repair putties, adhesives and a variety of mechanical and electrical applications involving mechanical or thermal shock.

Features: Two hardeners provide the formulator with a broad range of flexibility through a simple blending. They also permit a variety of systems of differing viscosities and end properties. Hardeners effect ready room temperature cures. They eliminate or greatly reduce blushing or oily surface film formation, even when used to cure thin films.

Description: Products are light amber colored, liquid modified amine hardeners. They are compatible with other amine hardeners, with polyamides and with polysulfides. Because of low viscosities (two-three poises for No. 2611 and 35-45 poises for No. 2613) hardeners handle easily and can be highly filled.

(Epotuf hardeners 2611 and 2613 are products of Reichhold Chemicals, Inc., RCI Building, White Plains, N.Y.)

Check 4306 opposite last page.

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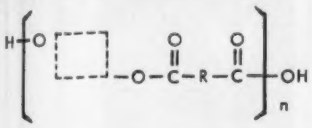
Check 4308 opposite last page.

Isosorbide

From page 69

resin of altered properties.

Polyesters of a general type:



tend towards crystallinity, rigidity, high melting point, high thermal stability, and low solubility in nonpolar solvents (hydrocarbon type).

If the "R" in such polyesters is the maleic group, cross-linking can be with either styrene or diallyl phthalate.

Resulting resins are showing promise for special coatings, such as for the inside of cans containing fatty substances such as meat products.

On the other hand, mono simple esters exhibit promising surfactant properties. With isosorbide as the starting material, the hydrophobic portion of the surfactant molecule can be tailored to vary oil solubility.

Economics

When isosorbide reaches the multi-million-lb annual production level, Atlas' F. Faxon Ogden, Director of Chemicals Product Development, estimates its price will be in the range of 40-50¢/lb. Present development quantities — pilot-plant production, drums, up to ½ million lb/yr — are available at 75¢ per pound.

(Isosorbide is a product of Atlas Powder Company, Chemicals Division, Chemicals Product Development Department, Field Development Section, Wilmington 99, Del.)

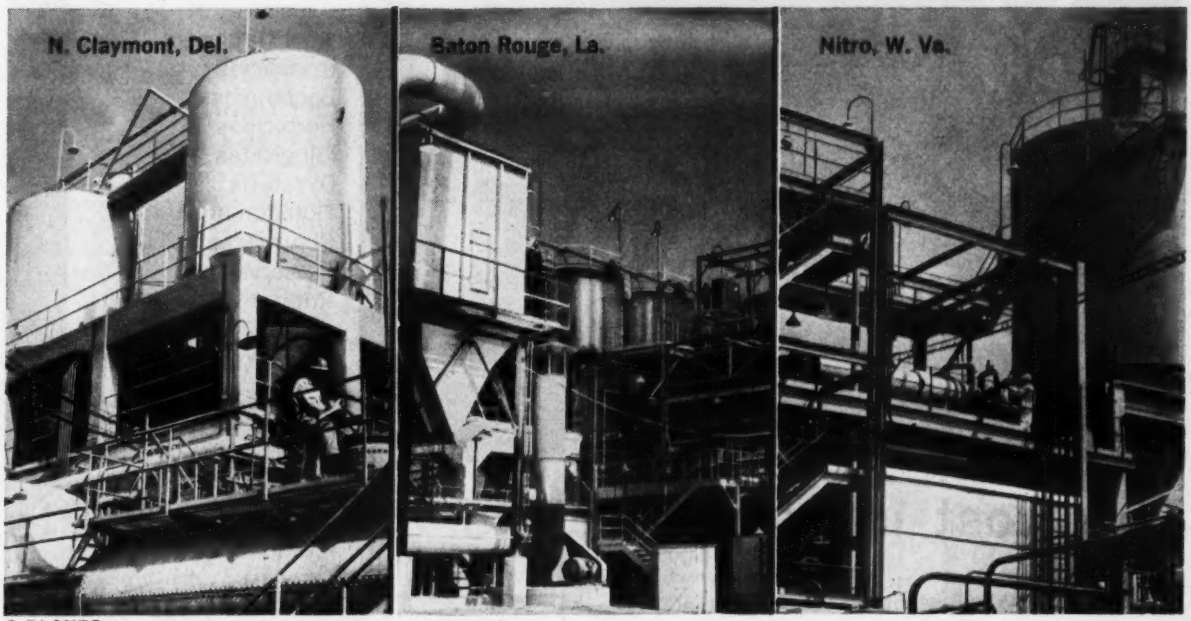
Check 4309 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

BASIC REASONS FOR MAKING GENERAL CHEMICAL YOUR "HQ" FOR HF



EXTENSIVE FLUORSPAR RESOURCES. Basic to the point of owning large fluorspar reserves as well as mines and mills, General Chemical is the nation's leading producer of hydrofluoric acid. By controlling its raw material resources, General Chemical protects you against interruptions of supply.



3 PLANTS. General Chemical produces anhydrous and aqueous hydrofluoric acid at the following three locations: North Claymont, Delaware; Nitro, West Virginia; and Baton Rouge, Louisiana.



5 STOCK POINTS. General has five bulk storage and packing stations in the United States for aqueous HF. Each backs up the others—assuring availability and prompt service at all times.

With its outstanding resources for essential raw materials—fluorspar reserves, mines and mills—plus a broad network of 18 sulfuric acid plants, General Chemical's *basic* position in hydrofluoric acid production is unmatched.

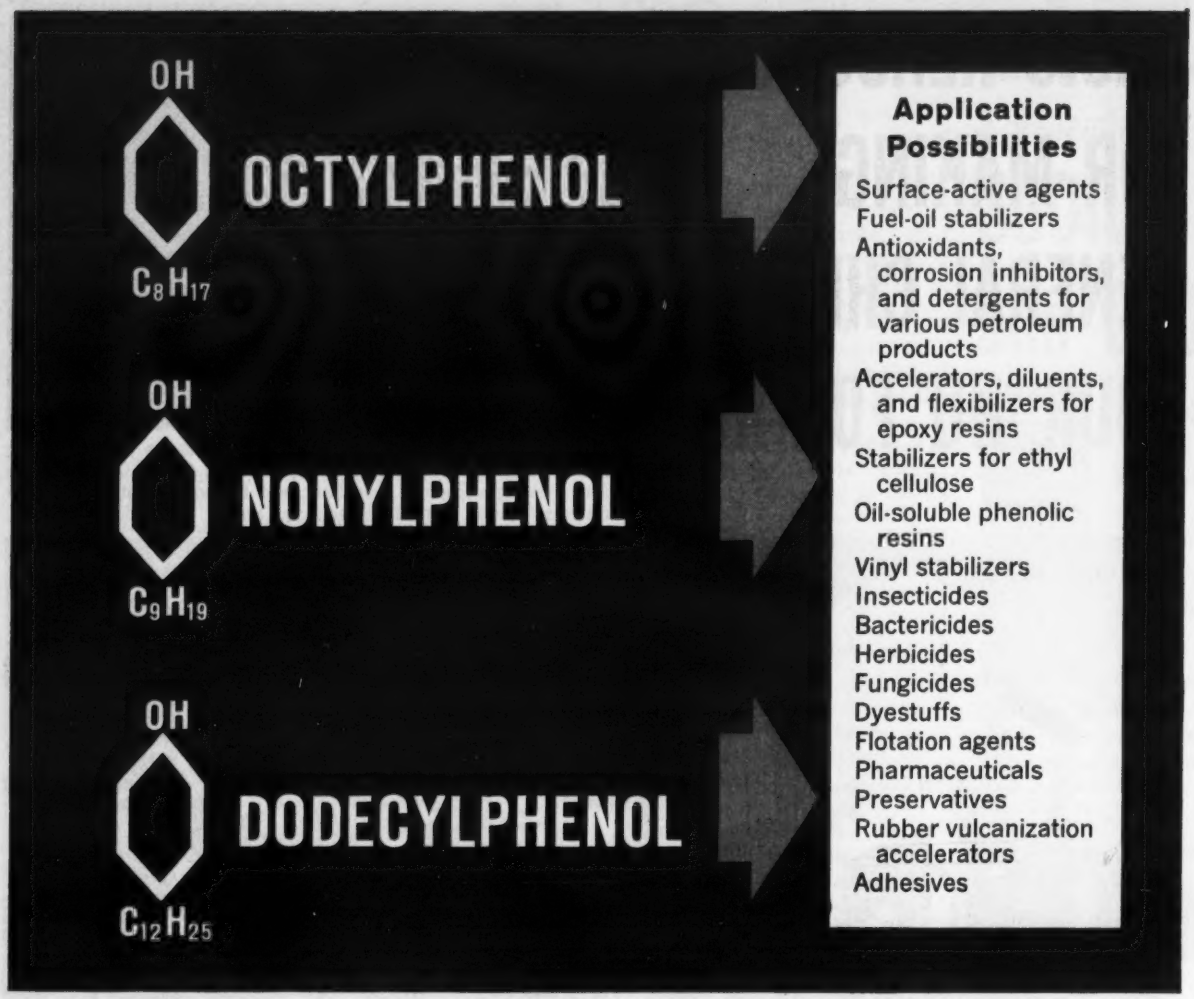
What's more, General is the *only* supplier offering shipment of hydrofluoric acid from more than one producing location. It supplies *anhydrous* and *aqueous* HF to its customers from *three* producing works and *aqueous* HF from an additional *five* company-owned locations.

Whenever and wherever you need hydrofluoric acid, call on General Chemical—your "HQ" for HF!

Allied Chemical

GENERAL CHEMICAL DIVISION
40 Rector Street, New York 6, N. Y.

Check 4310 opposite last page.



Low cost intermediates for many products

Rohm & Haas alkylphenols—available in quantities ranging from drums to tankcars—are low cost, reactive intermediates for a wide variety of products.

All three alkylphenols undergo the normal reactions of the phenolic hydroxy group and nuclear substitution of the benzene ring. Useful reactions include etherification with ethylene oxide, condensation with aldehydes and sulfur halides, salt formation with alkali metal hydroxides, esterification, sulfonation, halogenation, and nitration. The alkyl groups in the para positions provide compatibility with oils, resins, and rubber. They also direct substitution reactions to the ortho positions.

LITERATURE AND SAMPLES

Write to Dept. SP-14 for samples and a 16-page booklet covering reactions, uses, physical properties, storage and handling.



Chemicals for Industry

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

ALKYLPHENOLS

Check 4311 opposite last page.



Stable palladium alloy

A spectacular comparison results when strips of pure palladium and a recently introduced palladium alloy are heated and cooled in a hydrogen atmosphere. Both strips above have been alternately heated and cooled in hydrogen for same number of times and to the same temperatures. Strip on right is alloy.

It is being produced in form of diffusion cells for selective separation of ultra pure hydrogen from hydrogen-containing gas mixtures. Cells can be furnished in sizes for laboratory, pilot plant and commercial units.

(Palladium alloy is product of J. Bishop & Co., Platinum Works, Malvern, Pa.)

Check 4312 opp. last page.

High molding speeds ready ABS plastic for consumer goods

Uses: Plastic was formulated particularly for use in consumer goods fabrication.

Features: Composition of material has been modified so that it can be molded at high speeds. It can be injection molded at speeds approximating those achieved with cellulosics, impact styrenes and polyolefins. Parts have gloss and decorative appearance required in consumer market.

Description: Material, called Kralastic MH, is of the acrylonitrile-butadiene-styrene family. It exhibits good dimensional stability, high mechanical strength and excel-

ADVERTISEMENT—*This entire page is a paid advertisement* *Prepared by U. S. Industrial Chemicals Co.*

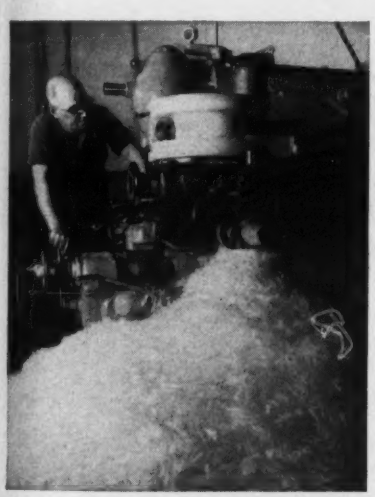
U.S.I. CHEMICAL NEWS

★ A Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★

Polyethylene Used for Insulators in Nuclear Weapons Research Work

Two large polyethylene insulators, 18½ inches in diameter, have been made for use with a unique electrical switch in the discharge of heavy current loads from large condenser banks. Insulators and switch are reported to be part of research equipment used by nuclear physicists in the simulation and study of various aspects of nuclear weapons systems.

Polyethylene was chosen for its good insulating qualities, it is reported. Each insulator is said to be capable of withstanding voltages in the neighborhood of 100 kilovolts. The insulators were carefully milled to insure design compatibility with the special two-million-ampere switch.



Milling polyethylene insulator for use with unique electrical switch in nuclear weapons research. (Photo courtesy Boeing Airplane Co.)

New Chlorine Booklet Is Offered by U.S.I.

Facts about chlorine are detailed in a concise new booklet just released by U.S.I. Illustrated with photographs, drawings, graphs and charts, the 28-page booklet describes chlorine's chemical and physical properties in detail, and gives information on shipping, handling, safety measures and applications.

The company is preparing a similar publication on caustic soda which will be available shortly. For your copy of the chlorine booklet, write to the Technical Literature Dept., U.S.I. Chemical News, 99 Park Avenue, New York 16, N. Y.

Sodium Process Developed by U.S.I. Proves Economical for Desulfurizing Coke Oven BTX

Thiophene Levels in Benzene-Toluene-Xylene from Coke Oven Sources Reduced to Less Than 1 PPM. Purities Match Those Of Petroleum Products, with Treating Costs of Only 1-2¢/Gal.

Recent demands for low-thiophene benzene and toluene are creating new interest in desulfurization processes. To remain competitive with low-thiophene petroleum fractions, coke oven producers today must further treat their light oils to reduce thiophene content. Usual specifications are less than 1 ppm. Workable treating processes developed so far have proved economical only for very large scale coke oven operators who can invest in extensive equipment. The smaller operator has remained handicapped, and has been seeking methods involving lower capital outlay.

Recently, U.S.I. has been working with coke oven producers on the application of sodium desulfurization to this problem, with some very practical results. It has been found that, for only a little over a cent per gallon in treating costs, light oil feeds from coke oven sources can be purified to the desired levels. Further, this processing method is economical even for the small-scale producer.

Two U.S.I. Processes Available

Two general processes have been worked out by U.S.I. for the sodium desulfurization of light oil feeds in the vapor phase. In one, a mechanically agitated high-surface-sodium bed is used. In the other, vapor fluidized high-surface-sodium is employed.

Many samples of light oil from various parts of the country have been investigated in pilot units of these two types at U.S.I.'s research laboratories. The results of three such investigations, with calculated direct operating costs, are given in the

MORE

National Distillers—Food Machinery Joint Venture Gets Rocket Fuel Contract

Contracts for multi-million pound quantities of unsymmetrical dimethylhydrazine have been awarded by the Air Force Air Material Command to a joint venture of the Food Machinery and Chemical Corp. and the U.S.I. division of National Distillers. These contracts total more than $20,000,000. The material, called DIMAZINE* by the joint venture, is a storable, high-energy liquid rocket fuel.

FMC and U.S.I. pioneered in the commercial development of unsymmetrical dimethylhydrazine, and have been its principal producers for several years. The Air Force's DIMAZINE requirements will be produced in expanded facilities at Baltimore, Md.

DIMAZINE is a completely synthetic fuel. It is used with liquid oxidants in bipropellant engines of the type that power most of this country's large rocket vehicles as well as various smaller ones. Unsymmetrical dimethylhydrazine is unique in being the only synthetic fuel used in a substantial number and variety of the nation's operational rocket programs for scientific and military purposes.

*Registered Trademark of Food Machinery and Chemical Corp.

PILOT PLANT DATA—SODIUM DESULFURIZATION TEST RUNS

Acid-Washed BTX Sample	Process	Temp.	Na Level #/gal. feed	Contact time, sec.	Orig. thiophene content ppm	Final thiophene content ppm	Cost of treatment ¢/gal.*
A	Mechanically Agitated Reactor	450–500°F	.025#/gal.	10 sec.	45 ppm	less than 1 ppm	1.4¢/gal.
B	Fluidized Bed Reactor	450–500°F	.013#/gal.	10 sec.	1,000 ppm	less than 1 ppm	1.1¢/gal.
C	Agitated Reactor	450–500°F	.01#/gal.	10 sec.	170 ppm	less than 1 ppm	1.7¢/gal.

* These are total calculated operating costs—including raw materials, utilities, labor and maintenance—for 3 different locations and different capacities. Cost figures are therefore not comparable.

★ U.S.I. CHEMICAL NEWS ★

CONTINUED

Sodium Desulfurization

accompanying table. These figures are for BTX mixtures. The same processes can be used to treat benzene-toluene, benzene alone, or toluene alone—at still lower operating costs.

Distillation Removes Many Impurities

While the whole crude light oil may be desulfurized with sodium, distillation prior to sodium treatment is a more economical method for removing many of the sulfur compounds and other impurities present. Thiophene, of course, cannot be removed economically by distillation. An acid wash prior to sodium treatment is also used frequently to lower the level of some impurities.

Since purity requirements are usually less critical for xylene than for benzene and toluene, it is generally considered preferable to separate xylene from BTX mixtures before sodium refining. This minimizes sodium consumption. If necessary, xylene can be purified by itself.

For further information, send for the new U.S.I. technical data bulletin "Desulfurization of Benzene, Toluene and Xylene by Sodium." Address Technical Literature Department, U.S.I. Chemical News, 99 Park Avenue, New York 16, New York.

For commercial-scale processes developed by U.S.I., and for their costs, U.S.I. can put interested parties in touch with engineering companies who have developed plant designs for these processes.

Process Good for Many Hydrocarbons

Sodium desulfurization has also been used successfully with other hydrocarbons such as naphthalene. U.S.I. researchers have broad experience with this process, and will be glad to work with interested companies.

New Extinguisher Quenches Three Types of Fires

For the first time in history, a fire extinguisher has been developed which will put out all types of fires, according to recent reports. The extinguisher is said to do an effective job of quenching the three principal kinds of fires—those in combustibles like paper and wood, those involving flammable liquids like gasoline, and those in electrical equipment.

It uses a non-caking and moisture-repellent dry chemical which expands into a rubbery mass when exposed to heat. This action tends to smother the fire.

Up to this time the many kinds of fire extinguishers have been able to handle one, and sometimes two, classes of fires, but never all three. While the new extinguisher is claimed effective on all three, it does not supplant other extinguishers which may have superior quenching powers on a particular type of fire.

Rapid Chemical Reactions Analyzed by Photoflash

By exposing various materials to billion-watt flashes of light that last only a millionth of a second, chemists have recently observed many of the short-lived substances that play key roles in photochemistry, it is reported. Called "flash photolysis," the new analytical technique has already revealed the details of important chemical processes in areas ranging from inorganic chemistry to biology.

The technique employs a microsecond flash of strong light to start the reaction. Then, after an interval of a hundred thousandth of a second or less, the mixture is analyzed spectroscopically by a fainter burst of light. In this way, intermediate products with a lifetime of only a few millionths of a second have been positively identified, according to the report.

TECHNICAL DEVELOPMENTS

Information about manufacturers of these items may be obtained by writing U.S.I.

Patented process for making organic microfibers now being licensed. In process, vinyls, acrylics, nylon, polyesters, asphalt, etc., are melted or dissolved and sprayed to form superfine fibers. Suggested for filters, other uses. **No. 1620**

Variable programming systems, for automation of chemical analyses and procedures in clinical and biochemistry, now on market. Units include indexing, transfer, storage, centrifuging, incubating, programming mechanisms. **No. 1621**

Corporate diagrams and administrative personnel of the chemical industry are presented in new, looseleaf edition of reference book now being sold. Supplement also supplied to keep information up-to-date. **No. 1622**

Counter-current, liquid-liquid extractors for complex solvent extraction are described in new bulletin now available. Extractors incorporate several mixing and separating stages in single bowl revolving at high speed. **No. 1623**

How ammonium nitrate behaves under fire conditions is covered in new article which can now be purchased at nominal price. Conditions necessary for explosion are detailed, as are fire-fighting procedures and storage methods. **No. 1624**

POLYMER, a new international quarterly devoted to science of large molecules, is now offered on paid subscription basis. Provides medium for publication of original papers on chemistry, physics, applications of polymer research. Includes publicity on papers to come. **No. 1625**

Technique for producing flame-resistant urethane foam of polyester type is described in new bulletin now available. Reveals that additions of tris (beta-chloroethyl) phosphate (TCEP) to foam mix controls burning rate. **No. 1626**

New, low-cost infrared spectrophotometer makes possible high-resolution runs in near-infrared wavelength region between .83μ and 7.65μ. Gives exact structural information on organics with C-O and O-H molecular configurations. **No. 1627**

Alkaline electrocleaner, containing chelating agents, has been introduced for heavy-duty anodic cleaning of heavily soiled steel which has enough smut, rust or oxides to defy complete cleaning in conventional electrocleaners. **No. 1628**

Tantalum and niobium metallurgy are subject of recent book which can now be purchased. Covers extraction, reduction, consolidation, working. Includes chapters on physical, chemical, mechanical properties; corrosion; alloys. **No. 1629**

PRODUCTS OF U.S.I.

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Sodium Peroxide

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Organic Solvents and Intermediates: Normal Butyl Alcohol, Amyl Alcohol, Fusel Oil, Ethyl Acetate, Normal Butyl Acetate, Diethyl Carbonate, DIATOL®, Diethyl Oxalate, Ethyl Ether, Acetone, Acetoacetanilide, Acetoacet-Ortho-Chloranilide, Acetoacet-Ortho-Toluidide, Ethyl Acetoacetate, Ethyl Benzoylacetate, Ethyl Chloroformate, Ethylene, Ethyl Sodium Oxplacetate, Sodium Ethylate, Urethan U.S.P. (Ethyl Carbamate), Riboflavin U.S.P.

Animal Feed Products: DL-Methionine, MOREA® Premix (to authorized mixer-distributors).

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lent resistance to impact that have been a characteristic of this family of plastics.

In addition to injection molding, material also processes easily when used in the



Easy processing plastic teams toughness with attractive appearance in molded products

vacuum forming and sheet or profile extrusion. Molded parts can be machine, drilled, painted, metallized, cemented and nailed. It can withstand continuous exposure to temperatures up to 185°F.

(Kralastic MH is product of Naugatuck Chemical Div., United States Rubber Company, 1230 Avenue of The Americas, New York 20, N.Y.)

Check 4313 opposite last page.

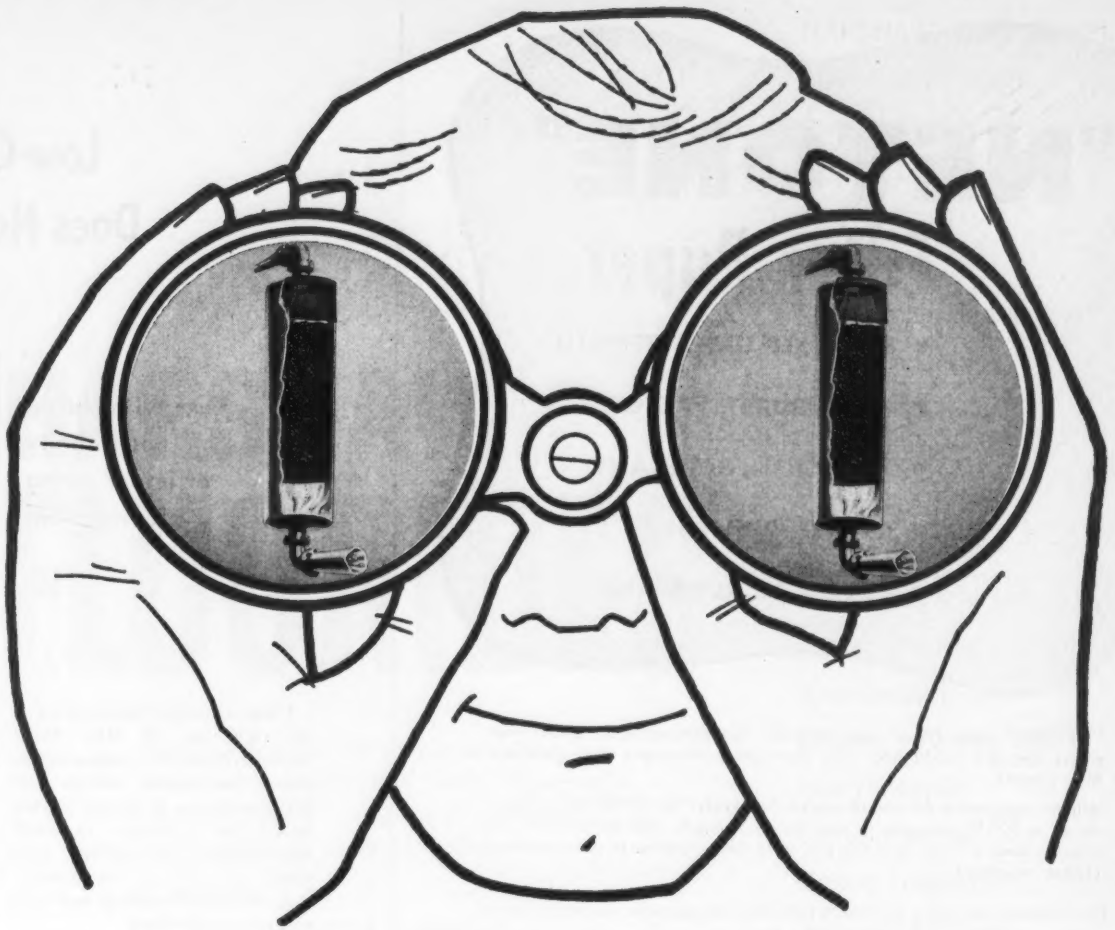
High strand integrity found in Fiberglas chopped strand

A more homogeneous molding material, which results in uniformity of finished parts, is made possible by a Fiberglas chopped strand with high strand integrity. Designed for use in compression molding, product mixes-in faster without clumping, improves compound flow, gives more uniform fiber distribution, improves strength uniformity by suppressing knit and flow lines and provides minimum surface distortion.

Chopped strand is priced at $0.44/lb and is available in ¼" lengths.

(HSI Fiberglas chopped strand is the product of Reinforced Plastics Division, Owens-Corning Fiberglas Corporation, 717 Fifth Ave., New York 22, N.Y.)

Check 4314 opposite last page.



Looking for practical ADSORPTION know-how?

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If you'd like an evaluation of your present adsorption system . . . or help in determining how continuous carbon adsorption can be effectively applied in your processing operations, call for a Pittsburgh Technical Service Representative.

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Versatile, coal derived Pittsburgh Granular Activated Carbons in continuous column systems have dramatically increased efficiency and lowered costs in a wide variety of adsorption processes including purification, decolorization, deodorization and catalysis. And they may be able to do the same for *you*.

Tell us about your adsorption requirements on your letterhead today or call for a Pittsburgh Technical Serviceman . . . he has adsorption "know-how."



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There's a type of Pittsburgh Granular Carbon ideally suited to solve your particular adsorption problem. Write for folder describing Pittsburgh Activated Carbons in both liquid and vapor phase applications . . . it's free.

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Check 4316 opposite last page.

For more information on product at left, check 4315 opposite last page.

"NETONE" Filter Paper

- HIGH TENSILE STRENGTH
- HIGH BURST FACTOR
- ABRASION RESISTANT
- CREASE RESISTANT
- CHEMICAL RESISTANT

"NETONE" Filter Paper is a neoprene impregnated kraft paper that offers decided mechanicol and chemical advantages over standard filter papers.

When compared to 60-pound unbleached kraft "NETONE" Filter Paper shows a 500% increase in wet tensile strength, wet burst factor increases from 6 to 57 and there is a marked increase in abrasion and crease resistance.

The following are a few test results indicating comparative resistance factors.

Solution	60-Pound Kraft	Wet Strength Resin	Neoprene Treated (3%)
H_2O	0	72 hr.	86 hr.
10% HCL	0	6 min.	4 hr.
10% NaOH	0	6 hr.	72 hr.

Write us about your requirements and we will be glad to send samples for your testing.

..And for your filter cloth requirements we weave fabrics of treated Cotton, VINCEL†, SARAN, DYNEL, GLASS, DACRON††, TEFLON***, POLYETHYLENE, NYLON, ORLON*, AND POLYMAX†, Samples sent on request

* TM for duPont Acrylic Fiber
*** TM for duPont Tetrafluorethylene Fiber
† TM—NFM Reg. U. S. Pat. Off.
†† TM for duPont Polyester Fiber

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Alhambra (L. A. Area) California: 20 So. 1st St.
Chicago, Illinois, 6034 N. Cicero Avenue
Maquinaria Minera e Industrial, S. A., Mexico, D. F. Apartado #215
Houston, Texas: 1607 Jefferson Avenue

Check 4461 opposite last page.

Low-Cost Epoxy Diluent Does Not Affect Electricals

Furfuryl alchohol ups stability of latent curing formulations

Electrical Properties

Parts FA/100	0	10	20
Dielectric constant			
1 KC	4.3	4.3	4.3
1 MC	4.3	3.6	4.4
Power factor			
1 KC	0.0048	0.0045	0.0037
1 MC	0.0244	0.0266	0.0247
Volume resistivity ohm/cmX10^{14}	1.6	1.4	1.3

Uses: Furfuryl alcohol eases the addition of BF_3 MEA (borontrifluoride monoethylamine) to epoxy resins. BF_3 MEA acts as a latent curing agent for epoxies in such applications as casting, potting, laminating, encapsulating, adhesive bonding and vacuum impregnating.

In addition to this use, furfuryl alcohol also acts as a reactive diluent in epoxies. Flexural strength is increased, electrical properties are not affected.

Features: Although one of the few latent curing agents found satisfactory for epoxy resins, BF_3 MEA has poor shelf stability. It will hydrolyze with age, pick up moisture and lose strength. Use of furfuryl alcohol (FA)* greatly alleviates this problem. In laboratory tests, saturated solutions of BF_3 MEA in FA have remained stable for 100 days at 78°F. Addition of 1.2% water to the system has no effect on storage stability.

Furfuryl alcohol acts to reduce the viscosity of epoxies to aid penetration in laminating, bonding or impregnating. This viscosity reduction is achieved without loss of desirable properties and at less cost than with conventionally used glycidyl ethers. Unlike glycidyl ethers, FA addition does not cause a significant loss in volume resistivity. Viscosity can be easily adjusted to suit individual requirements.

Description: Furfuryl alcohol is a strong solvent, at room temperature, for both epoxy resins, and BF_3 MEA. Based on laboratory data, 100 parts of FA dissolve 31 parts of BF_3 MEA at 25°C. The addition of three parts of BF_3 MEA and 10 parts of FA to 100 parts of Shell Chemical's Epon 828 produces the following characteristics:

1 — Viscosity is reduced from 10,600 cps to 660 cps.
2 — A cast specimen heated 17 hr at 300°F, plus 17 hr at 425°F, shows a weight loss of only 0.5%.
3 — Cure rate in thin castings is reduced. Thicker castings show an increase in cure rate.
4 — Flexural strength is increased by 50%.

In testing for electrical properties, castings were made with Shell's Epon 828 catalyzed with three parts of BF_3 MEA to 100 parts epoxy resin, modified with varying amounts of FA.

A series of tests were made to measure cure rates of Epon 828 with varying amounts of

*Reg. U. S. Pat. Off., The Quaker Oats Co.

furfuryl alcohol and BF_3 MEA. Specimens were cast in form of cylinders 1" in diameter and 1" long and cured one hour at 150°C.

	Parts FA/100 parts resin	Shore D hardness
1.0 pts BF_3 MEA	0	60
	10	80
0.5 pts BF_3 MEA	5	65
	10	70

Since furfuryl alcohol does increase color development, applications where color is important are not considered likely.

(Furfuryl alcohol is a product of The Quaker Oats Company, Merchandise Mart Plaza, Chicago 54, Ill.)

Check 4317 opposite last page.

Two epoxy casting resins have wide use pattern in electronics

Introduction of two epoxy resins aimed at casting and potting fields provides increased selection for potential users.

Meta-cast 405 AP is an all-purpose filled epoxy casting system suitable for use from −60 to +200°C. In combination with proper curing agent, this resin can be converted to an intermediate B-stage solid at room temperature with a minimum of exothermic heat. Final cure is effected substantially exotherm free making resin system particularly desirable for encapsulation of heat sensitive components. Cured resin is a lustrous, hard, black solid with a Barcol hardness of 50.

Meta-cast 441 is a two-part 100% solids epoxy casting compound. Properties of cured material can be varied to suit, from a semi-rigid hard casting to a rubbery, flexible sealant. Cured material maintains impact resistance and tenacious adhesion over a broad temperature span.

(Meta-cast 405 AP and 441 are products of Mereco Products Division, Metachem Resins Corporation, 530 Wellington Ave., Cranston 10, R.I.)

Check 4318 opposite last page.

The 20th Century Genie

HARSHAW FLUORIDES

Harshaw first started to manufacture hydrofluoric acid in 1904. Today, Harshaw's Fluoride Division produces 26 different fluoride chemicals for as many industries.

In addition to

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HYDROFLUORIC ACID—Aqueous-Anhydrous

there is a long list of other fluoride chemicals. If necessary, you are invited to draw on the experience of our staff of technical specialists.

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- Fluoboric Acid
- Fluorinating Agents
- Frosting Mixtures
- Hydrofluoric Acid Anhydrous
- Hydrofluoric Acid Aqueous
- Hydrofluosilicic Acid
- Laboratory Fluorine Cells
- Lead Fluoborate
- Lithium Fluoride
- Metallic Fluoborates
- Potassium Bifluoride
- Potassium Chromium Fluoride
- Potassium Fluoborate
- Potassium Fluoride
- Potassium Titanium Fluoride
- Silico Fluorides
- Silicon Tetrafluoride
- Sodium Fluoborate
- Tin Fluoborate
- Zinc Fluoborate
- Zinc Fluoride



Check 4319 opposite last page.

Now on an installed-cost basis—

FLUOROFLEX-TS

TEFLON-LINED STEEL PIPE COMPETITIVE IN COST WITH COMPARABLE HIGH-CORROSION-RESISTANT PIPING MATERIALS!

®Fluoroflex is a Resistoflex trademark, reg. U.S. Pat. Off. ®Teflon is DuPont's trademark for TFE fluorocarbon resins.

Recent price reductions are the reason. They have been made possible, in many of the popular pipe sizes, by advanced technology, production improvements, and ever-increasing sales volume.

It is now possible to pipe your entire process in corrosion-impervious Fluoroflex®-T, at prices comparable, on an installed basis, with conventional piping material of far less corrosion resistance, particularly at elevated temperatures.

Case histories of economies resulting from Fluoroflex-T are being increasingly reported, citing ease and speed of installation with prefabricated lengths, lower checkout time, decreased maintenance, long equipment life, and elimination of process headaches and downtime. One plant equipped with Fluoroflex-T, in fact, reported savings of $60,000 per month in costs of maintenance, downtime, and product loss.

Why not investigate what a Fluoroflex-TS piping installation can mean to your company, in installed costs, overall economy, and long process life? Write for complete information today!

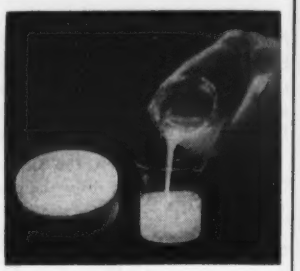
Complete corrosion protection: Fluoroflex-T, the proprietary Teflon® product manufactured and fabricated solely by Resistoflex, is completely resistant to any chemical (except high-temperature fluorine and the molten alkali metals) up to 500° F.! It combines optimum strength and non-porosity.

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- Lengths prefabricated to size, ready to install.
- Fittings compatible with all standard piping systems.
- Complete family of piping components available.
- Gasket and sealing problems eliminated by integral gasket formed from liner over full face of flange.

RESISTOFLEX
CORPORATION
Complete systems for corrosive service
Plants in Roseland, N.J. • Anaheim, Calif. • Dallas, Tex.
Sales Offices in major cities

Check 4320 opposite last page.



Polyethylene casting resin

Cured castings with physical and electrical properties similar to that of high density polyethylene can be produced with this polyethylene copolymer casting resin. Designated stycast TPM-5, it has excellent moisture resistance, reported to be better than other convention casting resins. It also exhibits low dieletric properties making it useful as insulation material in micro-wave, wave-guide and coaxial components. One-part system, when cured, can be used well above 225°F.

(Stycast TPM-5 is the product of Emerson & Cuming, Inc., Canton, Mass.)

Check 4321 opp. last page.

Lower thickener costs possible with these starch phosphates

Uses: Starch phosphates have demonstrated usefulness as thickeners in such food products as sauces and gravies. In non-food areas, potential uses are ore refining, pelletizing of low grade iron ore, water treatment and adhesives.

Features: Product provides what is regarded as remarkable freeze-thaw stability in food products. In other applications it could reduce cost by replacing certain higher priced vegetable gums such as gum arabic, locust bean gum and carboxymethylcellulose.

Description: Starch phosphates are esters formed between starch and a blend of acid phosphate salts. In formation of starch-phosphate esters, the starch is changed from a water insoluble to a cold-water soluble product. Starch phosphates range from

white to light tan in color, are extremely bland in flavor and completely digestible.

Research quantities of this material are being produced in a pilot plant with a large scale unit for commercial quantities now under study.

(Starch phosphates are product of American Maize-Products Company, Hammond (Roby), Indiana.)

Check 4322 opposite last page.

Light color, less odor mark fatty nitrogen fabric softener

Uses: Product is an intermediate for fabric softeners used in home and commercial laundries.

Features: Exceptionally light color and less residual odor on fabrics permit production of higher quality softeners.

Description: Product, called Adogen 442, is a dimethyl dehydrogenated tallow. It is available as a light-colored paste of 75% quaternary in isopropanol and water. It is water dispersible and soluble in polar organic solvents and many non-polar organic solvents. Material is compatible with non-ionic and other cationic surface active agents.

(Adogen 442 is product of Archer-Daniels-Midland Company, 700 Investors Building, Minneapolis 2, Minnesota.)

Check 4323 opposite last page.



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—from equivalent of distilled to 18 megohm quality

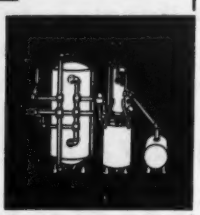
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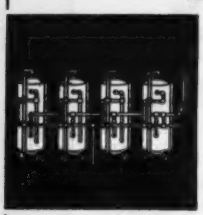
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Small mixed-bed type has exchangeable refill —delivers up to 2 gpm.
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Large mixed-bed type delivers water of high quality in any quantity.
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Any combination of anion and cation exchangers in sizes to meet any need.
Ask for Bulletin H4

Whatever the purity of water you need or the quantity you desire, Elgin can supply the correct type and size ion exchange equipment to deliver it. No requirement is too small—none too large for Elgin to handle efficiently. Whether it is a standard deionizer or one specially designed for the job, you are assured of expertly engineered equipment and trustworthy service for which Elgin has been known more than a half century.

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Call or write for bulletins.

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Check 4325 opposite last page.

CHEMICAL MATERIALS

Brighter nickel plate obtained with okra derived gum

A vegetable gum in dry powdered form, derived from okra, has proven particularly effective in providing a brightening action on nickel plate when added to the electroplating bath. It may also be used in plating silver, copper and cadmium. Brightening is sometimes increased to the extent that no further buffing or polishing is needed.

Rheological properties of okra dispersion are only slightly affected by presence of salts such as sodium chloride and sodium sulfate. Trivalent ions such as aluminum will coagulate the dispersion. Organic acids, such as citric and lactic, have little effect.

Okra gum analyzes as follows: carbon 40.4%; hydrogen 6.1%; nitrogen 2.1%; ash 6.6%. Gum is available in granular form and as a 200-mesh powder.

(Okra gum is product of Gum and Special Products Department, Morningstar-Paisley Inc., 630 West 51st Street, New York 19, New York.)

Check 4326 opposite last page.

Cost savings up to 10% in polystyrene with extender pigment

Uses: Material is suggested as a filler or extender in polystyrene compounds.

Features: Concentrations of from 20-30% have been used with no degrading effect upon compound's physical properties. Because of extender pigment's lower cost this can result in raw material cost savings as high as 10%.

Description: Wollastonite, a naturally occurring mineral form of calcium silicate is chemically inert. Particles are acicular in shape and specific gravity is 2.9.

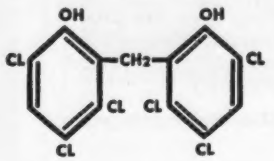
(Wollastonite extender pigment is a product of Minerals & Chemicals Division, Godfrey L. Cabot, Inc., 125 High Street, Boston 10, Mass.)

Check 4327 opposite last page.

King of bacteriostats . . .



G-11®
(HEXACHLOROPHENE U.S.P.)
(U.S. Pat. 2,250,480)



Sindar's G-11 (Hexachlorophene U.S.P.) now imparts bacteriostatic and deodorant properties to MORE THAN 2,000 PRODUCTS used in homes, hospitals and industries! Over 95% of America's hospitals use G-11 soaps or detergents for the surgical scrub . . . more consumer dollars are spent for G-11 soaps than for any other brand. In cosmetics and pharmaceuticals, too, **G-11 is the chosen antiseptic.**

Wherever a bisphenol is indicated, see Sindar! Write today for technical information and bulletins describing what G-11 Hexachlorophene *is* . . . and what it can do for *your* product.

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Check 4329 opposite last page.

NEW LITERATURE

Chemical Materials

Uses for both alcohol-soluble protein, Zein G-200, and aqueous alkali dispersible protein, Zein G-210, are described in two-color, 40-page booklet. Nature and properties, solubility and compatibility, formulas and preparation methods are illustrated with charts, tables and curves. "Two Versatile Industrial Proteins" — Corn Products Div., Corn Products Sales Company.

Check 4330 opposite last page.

Reactants and processing agents are among organic chemicals listed alphabetically in abridged edition of company's catalog. "Organic Chemicals Cat"—National Aniline Division, Allied Chemical Corporation.

Check 4331 opposite last page.

Flame resistant urethane foam production is described in technical information bulletin. Technical data shows effect of flame-proofing agent, tris (beta-chloroethyl) phosphate (TCEP), on "one shot" polyether systems. "Flame-Proofing Polyether Foams"—Mobay Chemical Company.

Check 4332 opposite last page.

Extender pigments in exterior latex paints are presented in bulletin of nine pages. Report details the effect of aluminum silicate, calcium carbonate, magnesium carbonate and calcium metalsilicate extenders at various loadings in white, red, green and yellow paints. Acrylic, polyvinyl acetate and styrene-butadiene latex emulsions are discussed. Bul T. I. 209-A — Minerals and Chemicals Corporation of America.

Check 4333 opposite last page.

Suspending agent for Carbopol polymers is explained in eight-page technical bulletin. A special section is devoted to formulating techniques. Sup No. 7 to Carbopol 934 Bul — B. F. Goodrich Chemical Company, Div., The B. F. Goodrich Company.

Check 4334 opposite last page.

Wetting agents are subject of brochure which outlines the manufacturers products representing several chemical classes. "Nopco Wetting Agents" — Nopco Chemical Company.

Check 4335 opposite last page.

Softeners for home and commercial laundries are described in duo of product information bulletins. Bul G-3570, G-3573 — Atlas Powder Company.

Check 4336 opposite last page.

BRIEFS

sodium sulfhydrate vs. sulfide
a dependable organic solvent and intermediate
phosphorus pentachloride reaction



SAVE 6.3¢ A POUND

On the basis of combined sulfur, sodium sulfhydrate is a far better buy than sodium sulfide. You get 62.6% more sulfur for a given weight of both products, which gives the sulfhydrate an edge of 6.3¢ a pound.

But that's not all. Hooker sodium sulfhydrate has high purity, 70% to 72% NaSH, most of the remainder being water of crystallization. Metallic contamination is kept to the order of 1 ppm for Cu, Ni, Cr, Mn, Pb. As low as 5 ppm for Fe.

Other advantages: rapid-dissolving flakes, even in cold water; little or no sedimentation; low alkalinity as compared with sodium sulfide.

We always ship in new, lacquer-lined drums which have full-open heads. The inert lacquer lining protects the product completely during shipment and storage. The full-open head makes for maximum ease in handling and charging your process.

See coupon for data sheet.

A SPECIAL TRICHLOR... NIALK® EXTRACTION GRADE

When you're extracting natural substances like vegetable oils, waxes, animal fats, or botanicals, use a trichlorethylene that really fits your process.

Our Nialk® extraction grade boils between 86.6 and 87.4° C. Its acidity, as percent HCl, is zero. Alkalinity, as percent NaOH, is only .006 to .008. Free halogen—none. No cloud at minus 12°C.

Moreover, our product meets these specifications *at all times.*



Other uses? Nialk extraction grade makes a flame-proof solvent for adhesives, can be used as a "stopping" agent to control chain lengths in certain polymerizations or as an organic intermediate, and is used to extract caffeine from coffee.

Check the coupon for data sheet giving full information on specifications, description, and uses.



IT'S IN THE "JOURNAL"

If you've ever wondered about the mechanism for the reaction of phosphorus pentachloride with ketones, we refer you to the August 20, 1959, *Journal of the American Chemical Society* for an interesting article offering several equations you may find useful. Incidentally, we make phosphorus pentachloride, a yellowish crystalline powder with a melting point of about 148° C. under slight pressure. Ordinarily it sublimes at about 160° C. at atmospheric pressure. Among its uses: a substitute for the oxychloride to obtain tricresyl phosphate; as a general chlorinating agent and catalyst; for organic synthesis. It finds much of its usefulness in pilot plant applications where its solid state is suited to small reactors. Check coupon for data.

For more information, check here and mail with name, title and company address:

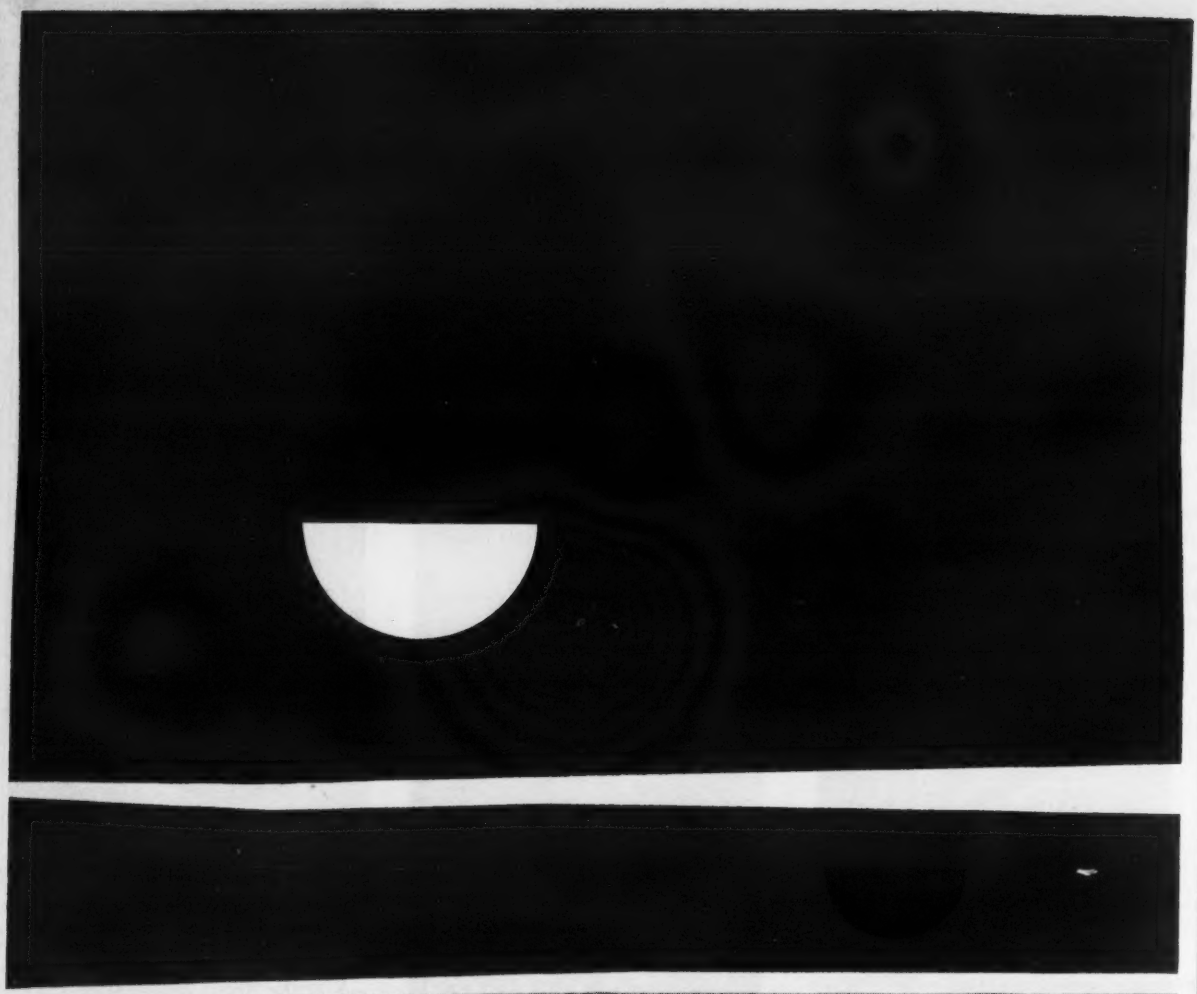
- ☐ Sodium sulfhydrate data sheet
- ☐ Sodium sulfide data sheet
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- ☐ Phosphorus pentachloride data sheet

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Check 4337 opposite last page.



Looking toward tomorrow, visualizing the shapes and courses it will take, anticipating its needs . . . this search for ways to serve industry better and more fully has been an unremitting spur to Sonneborn, since many tomorrows ago. Inasmuch as this quest dates back to the turn of the century and has been concentrated upon a specialized segment of petroleum refining, it is not surprising that in products, technical assistance, service, Sonneborn Goes Further.

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Check 4338 opposite last page.

CHEMICAL MATERIALS

Radioactive and stable isotopically labeled compounds useful in chemical and biological research are listed in 32-page revised catalog. Nearly 700 routinely available materials are included. Volk Cat 460 — Volk Radio-Chemical Company.

Check 4339 opposite last page.

Applications of Tenamene [3 (2,6-di-tert-butyl-p-cresol)] as an industrial antioxidant are discussed in 16-page brochure. Performance charts and graphs are used to demonstrate uses. Complete data on physicial properties are presented in tabular form. Bul I-107 — Eastman Chemical Products, Inc., Subs. of Eastman Kodak Company.

Check 4340 opposite last page.

Ethyl alcohol is comprehensively treated in 150-page book which contains complete commercial data, as well as calculations for reducing proof, test methods, government regulations, and a wide selection of physical properties. Government regulations, an important factor in industrial alcohol business, are presented as a separately bound supplement. "Ethyl Alcohol" bulletin is available on letterhead request from Technical Literature Department, U. S. Industrial Chemicals Company, Division of National Distillers & Chemical Corporation, 99 Park Ave., New York 16, N.Y.

Metallic pigment binder for use in printing on cotton, Fiberglas and other synthetic fibers is subject of a product information sheet. Morpatex 50 Bul — Textile Department, Morningstar-Paisley, Inc.

Check 4341 opposite last page.

Products for paint and how company's research, technical service and production departments serve the industry are presented in 16-page, well illustrated brochure. "Chemistry at Dow serves the Paint Industry" — Dow Chemical Company.

Check 4342 opposite last page.

Livestock and poultry feed supplement producers will be interested in four-page illustrated folder which presents data on use of Dicalcium Phosphate in these fields. "Dicalcium Phosphate" — Hooker Chemical Corporation.

Check 4343 opposite last page.

Urethane coatings recommended for wherever varnishes or lacquers have previously been used as finishes or protective coatings are presented in information File 1-60 — B. B. Chemical Company.

Check 4344 opposite last page.

Adhesives, laminating materials, putties and sandwich core are covered in condensed catalog. A temperature chart that indicates the upper and lower service limits for each adhesive and laminating material is featured. Narmco Condensed Catalog—Narmco Resins & Coatings Co., Division of Narmco Industries, Inc.

Check 4345 opposite last page.

Cesium booklet of 16-pages highlights uses, geology and mineralogy, metalurgy and future outlook for this little-known alkali metal. Growing role in ion engines for space flight is emphasized. "Cesium" — Chemalloy Minerals Limited.

Check 4346 opposite last page.

Liquid fertilizer stabilization is the subject of technical data sheet that describes use of a colloidal grade of Attapulgite as an agent for the suspension of plant nutrients in water. Data Sheet T. I. 959—Minerals & Chemical Corporation of America.

Check 4347 opposite last page.

Compounding rubber and formulating rubber-adhesives are main items covered in 16-page illustrated booklet. Highlight of booklet is a two-page chart which compares various resins available. Form S-79 — Schenectady Varnish Company, Inc.

Check 4348 opposite last page.

Users of nitrogen or nitrogen-hydrogen mixtures will be interested in booklet which details equipment for generating from 50-10,000 standard cu ft/hr. Flow diagrams, price lists and operating cost figures are included. "Nitroneal Generator" — Technical Information Department, Engelhard Industries, Inc.

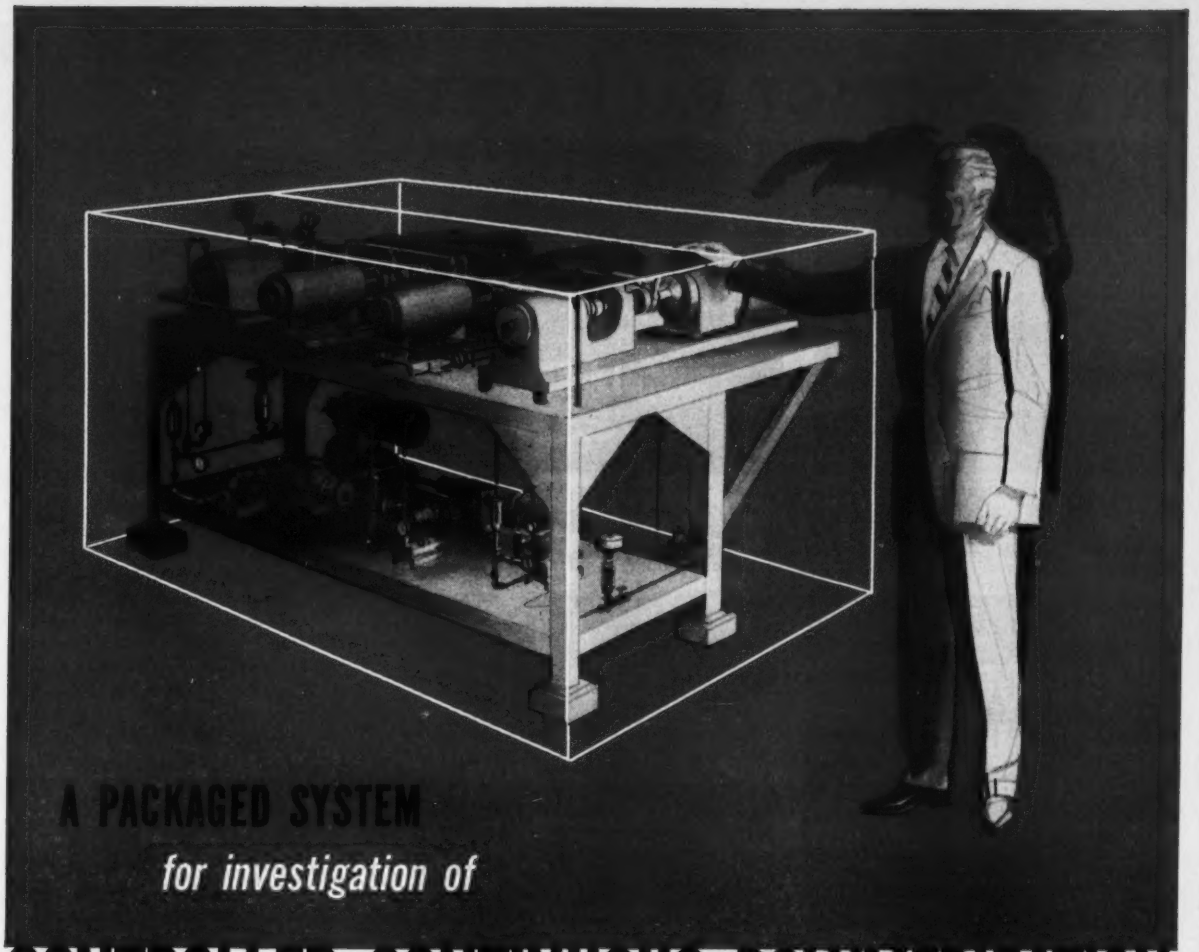
Check 4349 opposite last page.

Polyethylene extrusion coating facts are presented in eight-page reprint. New resin compounds, fabricating innovations and future markets are discussed. "Extrusion Coating Today" — Union Carbide Plastics Company, Union Carbide Corporation.

Check 4350 opposite last page.

Epoxy resins are detailed in 12-page pamphlet developed and produced under the auspices of Epoxy Resin Formulators Division of The Society of The Plastics Industry, Inc. Many industrial applications for epoxy resins are brought out with detailed explanations and photographs. "The Role of the Epoxy Resin Formulator in the Plastics Industry" — Department RP-58, Ren Plastics, Inc.

Check 4351 opposite last page.



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for investigation of
CONTROLLED CONTINUOUS POLYMERIZATION

VOTATOR* processing equipment is used for continuous polymerization reactions in numerous installations. It affords fast, efficient, controlled processing not possible in batch reactors.

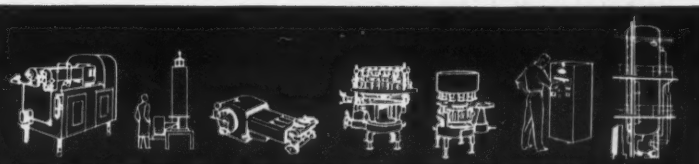
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Rugged, dependable VOTATOR continuous reactors are fabricated by skilled craftsmen in strict compliance with ASME codes. Materials of construction are carefully selected according to the properties of products processed.

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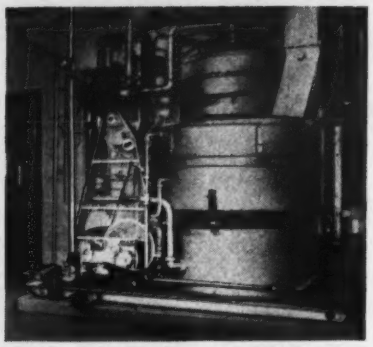
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Check 4352 opposite last page.

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STEAM PRESSURE_____
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Check 4356 opposite last page.

Businessmen in Politics *From page 28*

"If (Section 610) were construed to prohibit the publication, by corporations and unions in the regular course of conducting their affairs, of periodicals advising their members, stockholders or customers of danger or advantage to their interests from the adoption of measures or the election to office of men espousing such measures, the gravest doubt would arise in our minds as to its constitutionality."

The four-member minority considered the act unconstitutional.

The UAW, charged with violating the act by sponsoring television broadcasts endorsing a candidate, also won a victory over the Department of Justice — the indictment first being dismissed by district court, and the subsequent government appeal being returned by the Supreme Court to district court, where the union was acquitted.

The government also was bested in two other cases involving unions.

There have been convictions of companies — in 1916 when a number of Pennsylvania brewing companies pleaded guilty to helping finance the election of federal candidates; and in 1950 when 21 of 23 actions against Michigan automobile dealers led to fines. The latter cases involved contributions to a state political committee for use in the 1946 federal election.

Unions have managed to sidestep the apparent intention of the act in several instances.

The matter of political contributions is a prime example. Unions have established political organizations, manned by union officials drawing union salaries. These satellite groups raise money for direct partisan political action, a fact to which a considerable number of congressmen whose campaigns have received such assistance can attest.

How Far Should Corporations Go Into Political Activities?

In the light of the burgeoning involvement of businessmen in politics, the question is posed: What sentiment exists for loosening some of the restrictions of the Corrupt Practices Act to give corporations something more akin to a franchise in public affairs?

To find out, CHEMICAL PROCESSING sampled the views of top executives of chemical processing firms and those supplying engineering services and equipment to such firms.

The three most important questions asked these men were:

1) Should corporations be permitted to endorse and actively support favored political candidates?

2) Should corporations be permitted to contribute financially to the campaigns of favored candidates?

3) Would adoption of either or both of these practices pose any inherent danger to the rights of employes?

Six of the 11 executives checked answered "Yes" to question No. 1; only two replied in the affirmative to question No. 2. To question No. 3, seven replied "No." It's apparent that businessmen have mixed feelings about this controversial problem.

A number of those replying also supplemented their answers with qualifying comments.

For example, C. H. Greenewalt, president of E. I. du Pont de Nemours & Company, Inc., noted:

"The answers to the important questions 1, 2, and 3 would from my point of view be 'No.' I don't think the corporation as such has any right to a 'franchise.' A corporation is merely an aggregation of people who would have quite varying and distinct points of view and, frankly, I don't think there is any way, whether by polling stockholders, employes, or officers or directors, of getting a corporate point of view that would have any meaning at all.

"It seems to me that the corporation as such can properly speak only when the interests

of its stockholders or employes are very directly concerned. On policy questions it should be silent.

"Of course, just as the corporation should refrain from working for or contributing to candidates, the individual should have complete freedom to do so as such."

Broadcast Views, Not Money Say Some Corporations

Arthur I. Appleton, president of Appleton Electric Company, commented:

"It is my feeling that corporations should have the right to express their views, but should not be permitted to contribute financially to the campaigns of favorite candidates.

"I feel that there would be great danger in the future of very large corporations assuming too much control through ability to invest millions of dollars to further their interests which might be against the best interests of the country, which, of course, includes the general welfare of most of our people."

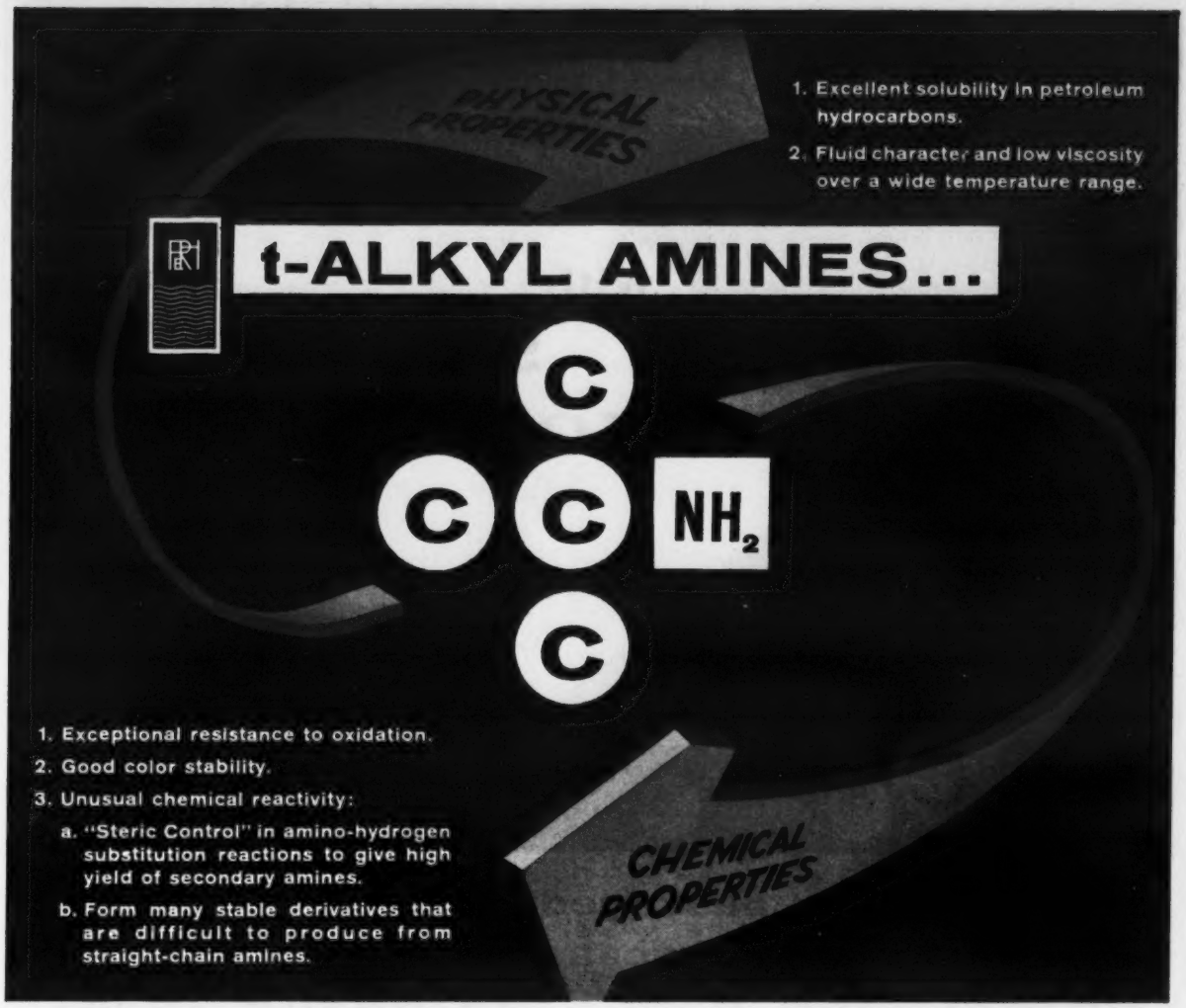
He went on, "I also feel that it is very important that the unions be stopped from contributing to various political parties and candidates."

This latter sentiment was echoed by several others responding.

J. S. Fluor, president of Fluor Corp., Ltd., declared, "I believe leaders of industry should support publicly candidates of their choice, but it should be done as individuals and not as spokesmen for their respective companies."

On the subject of corporate gifts, he said, "No corporate gifts for individuals, but this does not apply to proposed legislation detrimental to the individual company or the free enterprise system."

Another company official, who asked not to be identified, commented, "While you will note that I answer 'yes' to question No. 1, it is with a great deal of reservation. In general, while I agree that corporations, as such, have been disenfranchised, I think that corporations can do them-



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t-Alkyl amines are distinctly different from straight-chain primary amines in both physical and chemical properties. The highly branched structure of the t-alkyl amines gives you the unique physical properties; the attachment of the amino group to a tertiary carbon, the unusual chemical reactivity. Rohm & Haas t-alkyl amines are available in commercial quantities in a wide range of molecular weights. The lower amines are useful as intermediates in making surface-active agents, gasoline and oil additives, pharmaceuticals, corrosion inhibitors, flotation agents, rubber chemicals, insecticides, dyestuffs, anti-static agents, and textile chemicals. The higher amines are ideally suited for use as oil additives. Menthane diamine is an alicyclic diamine suitable for use as an epoxy curing agent and as a chemical intermediate.

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Businessmen in Politics

From preceding page

selves a great deal of harm unless they handle political activity of any sort very carefully. This is as compared with individuals in the corporation."

But Others Speak Out For Financial Support

The two executives who favored political contributions by corporations also requested that their comments be anonymous. Here, however, is what one official had to say:

In answer to question No. 1 — "The corporation is affected by governmental action as are citizens and taxpayers. While it has no vote in the election of those who take public office, it should be free to endorse and support those who will administer their offices with due consideration for the effect on the business climate."

Both of these executives favored limits on contributions. One suggested a "reasonable" amount; the other, restricting gifts to $5000 to $10,000.

One company executive had this to say about the present corporate role in the political picture:

"A corporation should be free to concern itself with the effect of government on business enterprise. The mere fact that men associate under a corporate form to do business should not deprive them individually or collectively from speaking and acting freely where such action or speech does not violate the rights of other individuals or run counter to the welfare of society.

"Corporations have all the duties and responsibilities of other taxpayers but lack the rights of other taxpayers."

Political Education of Employees Gaining Emphasis

Regardless of how they feel about the Corrupt Practices Act, businessmen are exploring the poorly defined routes to political action open to them.

Most of the programs seem to be geared to a principle outlined by Thomas Jefferson.

"I know of no safe depository for the ultimate powers of society but the people themselves; and if we think

them not enlightened enough to exercise their control with a wholesome direction, the remedy is not to take it from them, but to inform their discretion through education."

In effect, the corporate strategy is two-pronged: On one hand, it is to encourage employees at all levels to become politically involved in the party of choice and to tell them how to become effective politically. On the other hand, the goal is to inform employes of the issues and how they are affected by them.

The principal tool being used to accomplish the first objective is the Action Course in Practical Politics developed by the Chamber of Commerce of the United States.

More than 300 corporations and businesses have sponsored and are sponsoring these courses which, by the time this appears, will have reached 80,000 people.

About half of the participating companies are chemical processing companies, associated companies or equipment suppliers.

The roster includes such firms as E. I. du Pont de Nemours & Company, Inc., Monsanto Chemical Co., Olin Mathieson Chemical Corp., Hercules Powder Co., International Minerals & Chemical Corp., B. F. Goodrich Chemical Co., Eastman Kodak Co., The Chemstrand Corp., Mallinckrodt Chemical Works, Hooker Chemical Corp., Metal-Thermit Corp., and many, many more.

Between January 1959 and May 1960, 67,230 persons had been enrolled in these courses in 1063 communities in 50 states. Between 3500 and 4000 are being added monthly.

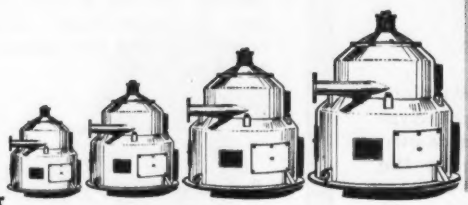
Additional information on the Action Course in Practical Politics can be obtained from Business Relations Department, Chamber of Commerce of the United States, 1615 H Street NW, Washington 6, D.C.

The course, planned for groups of 12 to 20 persons, consists of one two-hour workshop weekly for nine weeks. Information covered

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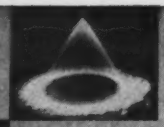
Third, because only Sharples has four sizes of Super Conejector from which to select the one best suited for your particular requirements.

The Super Conejector fills an important spot in slurry processing and in many dewatering applications it offers unexcelled efficiency, capacity, and low cost. We'll gladly send you descriptive literature on the Super Conejector.

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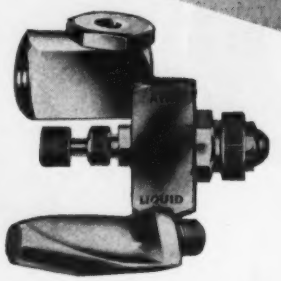
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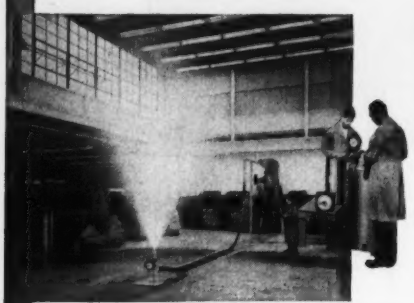
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Check 4360 opposite last page.

Businessmen in Politics

From preceding page

runs the gamut from why people should be active in politics to how they can be active in the political party of their choice.

For some corporations, the practical politics course is only a "tooling up" for a broader program of continuing education of employes through meetings, employe and stockholder letters, and house organs and political contacts by management people. Other corporations are supplementing the program with "Get-out-the-vote" campaigns and even drives to encourage political contributions to both parties.

Whether this activity will have much impact on the November elections or not is a moot question. Those who are leading the way are not looking for short-term results; their programs are geared for the long haul. ■

Polyisoprene Push

From page 32

the almost instantaneous heat buildup generated by high-speed landings.

Of course, polyisoprene is not yet the equivalent of natural rubber in every respect. It falls down in the cis-1,4 content, this not being exactly identical to natural rubber. It is fully expected, as time goes on, that more precise control will be achieved over this factor. Better molecular weight distribution in the polymer will also help to close the small gap between it and natural rubber.

Also, polyisoprene has the major disadvantage of price since it is based on isoprene, which is more expensive than butadiene. However, research studies indicate that isoprene will be produced to sell for no more than butadiene. Shell's recent announcement tripling planned isoprene production and other information suggest that this company may have made important headway in producing isoprene more economically.

Natural rubber is currently priced at 47¢/lb. For poly-

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Quality **GROUP** also for tough services, but less severe than the conditions served by the "Mastergauge"



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isoprene or polybutadiene to achieve large volume production, it should be priced in the 30-35¢/lb range since in the long run natural rubber can be expected to sell in that range also.

Polybutadiene Currently Can be Made for Less

Polybutadiene is based on butadiene, a product which has been in considerable excess supply. This makes polybutadiene economical to make and helps to overcome the problem of excess butadiene capacity. Firestone expects to start its plant as a polybutadiene producer and switch to polyisoprene, if and when warranted. Firestone's plan may be followed by a number of the other companies that will be able to produce both types.

Polybutadiene cannot be classified as a synthetic natural rubber. Its composition is different. It is difficult to process polybutadiene by itself because of dryness and poor tack.

Polybutadiene can be blended with natural rubber, resulting in satisfactory modulus, tensile strength, hardness and abrasion resistance.

The excellent abrasion resistant characteristics of polybutadiene rubber should allow it to find wide application in conveyor belts and other industrial goods subjected to hard use.

Increased resistance to cracking on passenger tires is another outstanding characteristic of this polymer. Service tests show that polybutadiene alone in treads gives significantly better wear than styrene-butadiene rubber. When blended with natural rubber, polybutadiene gives 10 to 15% better tread wear.

It is not believed that polyisoprene or polybutadiene will replace any of the other synthetics now being produced. SBR will continue to be the workhouse of the industry. In most cases, other types of synthetics are specialty rubbers and the demand for them will continue. The main role of polyisoprene and polybutadiene is to serve as replacements for natural rubber and

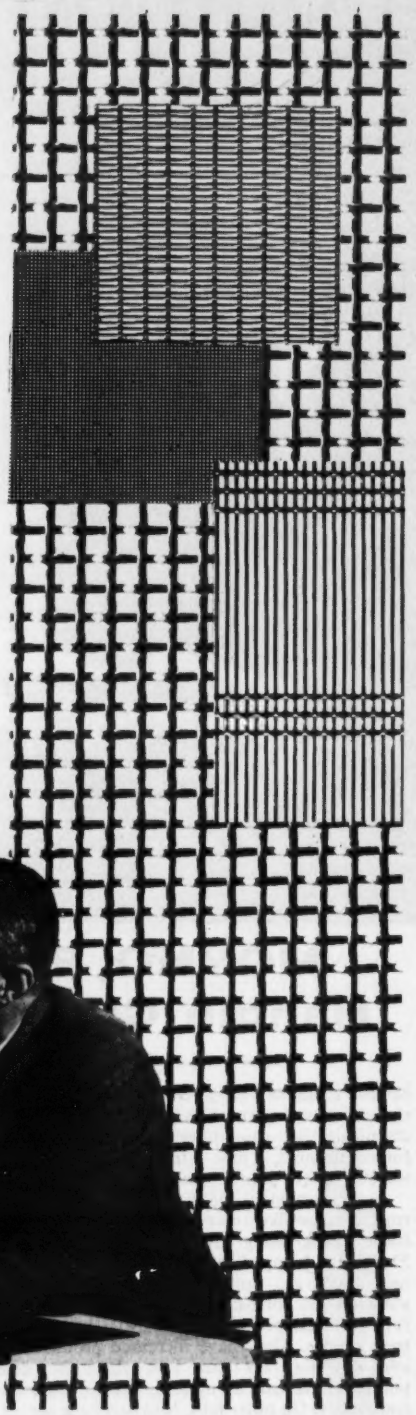
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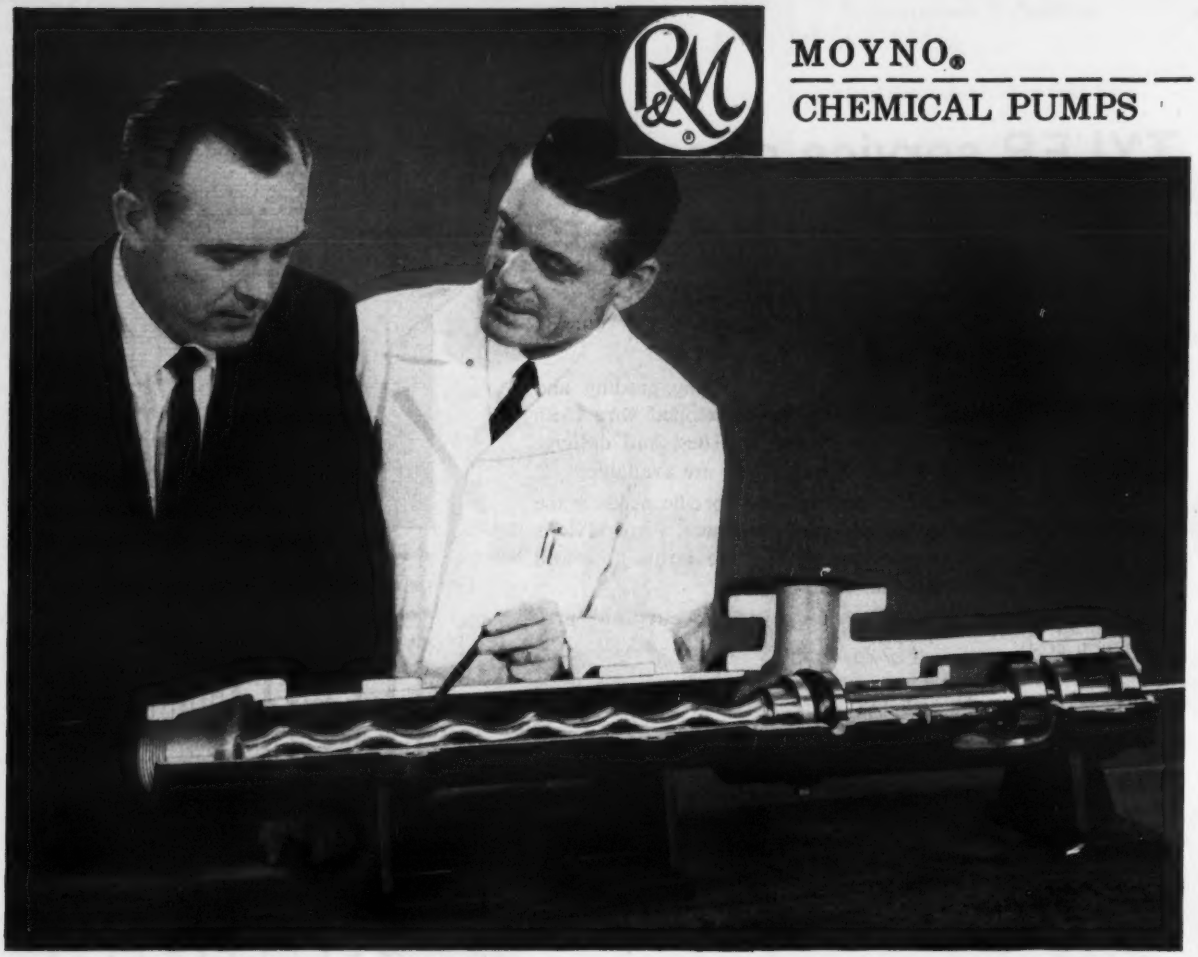
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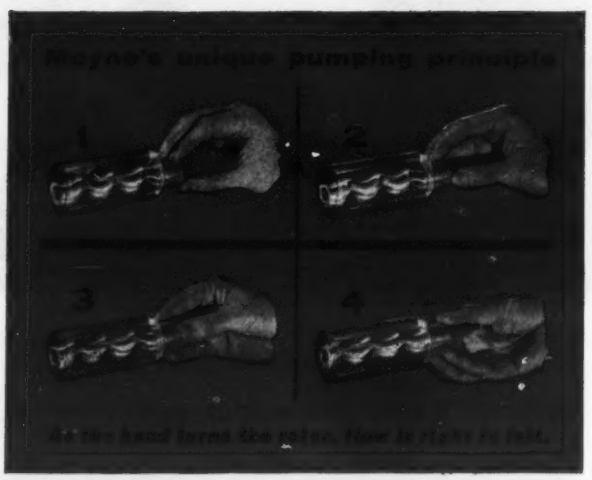
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MOYNO® Progressing Cavity Pumps Handle Chemicals that *Ruin Other Pumps!*

MOYNO's unique *"progressing cavity"* principle and special resistant internal parts slash pump maintenance costs on problem chemicals that ruin other pumps. Any chemical that can be forced through a pipe—from thin watery slurry to extremely viscous rubber dough—can be pumped with a MOYNO.

As illustrated at right and in the cutaway model above, a rugged screw-like rotor turning inside a double-threaded stator forms *"progressing cavities"* which move chemicals smoothly. Fluids are pumped without turbulence, agitation or pulsation, and discharged uniformly. Rotor and stator materials resist abrasion and corrosion. Hundreds of difficult chemicals successfully handled prove that MOYNOS show little wear, even after long service. They have increased production and greatly lowered downtime on many jobs where they replaced other type pumps which had run up prohibitive maintenance costs or failed completely. On other jobs, MOYNOS have succeeded where chemicals were formerly moved by hand or other expensive means because they were considered unpumpable.

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Polyisoprene Push

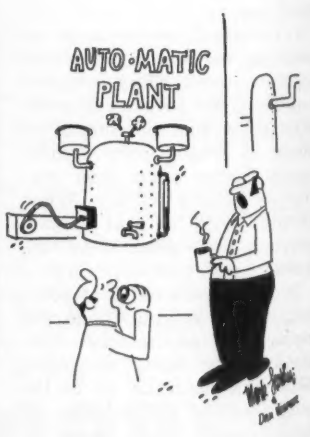
From preceding page

meet the increasing market for rubber in the U. S. and the world.

The emergence of these new rubbers as major factors in a highly competitive industry has depended to a great extent on development of the stereospecific catalysts. Extreme care must be exercised to eliminate air, moisture and polar materials such as alcohols, ethers and ketones which might destroy or activate the catalysts.

Plants now being designed or under construction to produce these new rubbers will use Ziegler-type or lithium-derived catalysts. Each catalyst is specific in the type of polymer it will produce. Much remains to be learned about the true mechanism by which these catalysts are capable of forming such highly ordered polymers as cis-1,4 polyisoprene.

The timing of the development and production of polyisoprene and polybutadiene synthetic rubbers has coincided with growing inability of plantations to meet the ever increasing total world demand for rubber. The new rubbers also contribute a stabilizing influence to natural rubber prices, which have a long history of wide fluctuations. ■



"Whoever programmed that tape sure makes lousy coffee."

Mark Larkin and Dan Vesper, Electra Mfg. Co.

Company Callers

From page 29

arrived for a luncheon appointment at 12:05. His fault, he should have been there at 12:00! However, that five minutes nearly finished him.

He proceeded to the reception desk and was greeted by a telephone with a big padlock on it. The receptionist was out to lunch. He then started buttonholing people to ask how to proceed to the office of the person he was to see. Nobody had ever heard of him and had no idea where he might find this person. Finally, someone told him to go to a drugstore nearby and telephone him. He did and the line was busy.

In desperation, the visitor finally returned to the building and arbitrarily rode the elevator up to the sixth floor and asked the first girl he saw at the desk. She was able to locate the man he was to see, and he finally met him at 12:30, 25 minutes after his arrival.

Many Top Executives Answer Their Own Telephones

Returning to the subject of telephones, an entire book could be written on how to use them properly. However, when a person has to repeat complete biographical data to two or three girls and practically has to forward his birth certificate before he can talk to the great and mighty person he wishes to reach, it becomes a little discouraging. Quite often it is a fellow in the lower echelons who puts on the most telephone airs to try to boost his ego.

A recent report revealed that 40% of executives contacted in a survey answer their own telephones without any secretarial screening. Nearly all of the executives surveyed look on the "Who's calling?" question asked by many secretaries as a "criminal offense." The practice of having a secretary make and answer calls gets to be a game as to who will answer first or who will be kept waiting while the other person takes his time about answering the telephone on a call his girl has placed for him.

Maybe I am biased. You see, our own company president, Russell L. Putman, answers his own telephone when working in his office as do many of the executives at W. R. Grace Company, Du Pont, American Cyanamid, Union Carbide and other companies. This surely builds good will.

No Telephone Run-around At Union Carbide

At the new Union Carbide Corporation building in New York City, company has the new DID (direct inward dialing) setup which permits the party you wish to reach to be dialed directly without call going through the switchboard. This saves a great deal of time and makes people, including some important customers, think well of UCC.

Many companies do an excellent job of public relations where personal contact is involved. One of those is the Jones & Laughlin Steel Corporation in Gateway Center at Pittsburgh. Here a visitor enters a large, tastefully decorated reception room, staffed with courteous receptionists and containing comfortable chairs and ample reading material. A sign states that visitors should feel free to use the telephones for outside calls and should ask the receptionist to ring the party again they wish to see if they have been waiting long. (Of course, a visitor shouldn't expect to make free long-distance calls.)

Numerous other examples could be given of companies that do practice very fine public relations on these personal contacts. Usually in the South or Southwest a visitor is received the best. Southern hospitality is practiced to a high degree by most offices and plants in such places as Texas and Louisiana.

The thing that is amazing, however, is that there are still numerous occasions where companies fail to practice good personal public relations. For example, a company may spend thousands of dollars for a plant dedication — then not follow up with small courte-

WHATEVER THE BREATHING HAZARD



Scott Sling-Pak Model 6000-B4A

When seconds count, reach for the Scott Sling-Pak. This model is the fastest piece of emergency equipment made. Ideal for fast, safe entrance into hazardous atmospheres. Cylinder holds enough pure breathing air for 15 minutes of hard work. Breathing protection at lowest cost.



Scott Air-Pak Model 6000-A2MS



For dangerous jobs of longer duration. Safe, comfortable breathing protection for a minimum of 30 minutes at extreme exertion. Bureau of Mines Approval No. 1308.

Scott Demand Respirators

Designed especially to provide breathing protection in atmospheres not immediately dangerous to life and from which the wearer can escape without breathing equipment. Cylinder models and plant air-supply models available. Bureau of Mines Approval No. 1924.



Scottoramic Mask



Provides picture-window vision in all directions for greater safety.

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Military and civilian installations throughout the world, handling exotic fuels and chemicals, are depending on Scott Protective Breathing Equipment to solve their respiratory problems.

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Export: Southern Oxygen Co., 250 West 57th Street, New York 19, N. Y.

Check 4364 opposite last page.

EXECUTIVE REPORT #27

When the Code Requires a "Clean Stack"

CLOTH FILTERS BEST

And Wheelabrator® Dustube® Collectors are the most efficient and economical way to filter with cloth. Dustube systems will collect dust and fumes regardless of concentration or particle size, with collection efficiencies above 99% by weight and 95% by discoloration test. By using appropriate synthetic filtering fabrics, Dustube systems are successfully filtering corrosive and abrasive particles, at temperatures up to 550° F in many applications.



DUSTUBE SYSTEMS OFFER THE MOST FAVORABLE BALANCE OF COST AND COLLECTION EFFICIENCY

In a wide variety of applications, Wheelabrator Dustube Collectors have proven to be the most economical system capable of delivering the required collection efficiency. For engineering data write to Wheelabrator Corp., 478 S. Byrkit St., Mishawaka, Ind. In Canada, P. O. Box 490, Scarborough, Ont.

WHEELABRATOR
DUST AND FUME CONTROL

Check 4365 opposite last page.

NEW! PRINCO

DENSITROL W-756

for direct and continuous indication of specific gravity in process liquids



This rugged, extremely accurate, dependable DENSITROL offers time and money saving advantages:

1. Immediate availability from stock — in custom ranges for .05 or .10 span, in any range between .65 and 1.40 limits.
2. Exceptional corrosion resistance — wetted surfaces are Pyrex, Tantalum and Teflon.
3. Accurate to ± 1%.
4. Extremely rugged — body is Double-Tough Pyrex.
5. Non-electrical — no explosion hazard.
6. Single adjustment corrects for temperature — density effects.
7. Continuous, immediate in-line indication.

Send for Bulletin W-9, or write, wire or phone for further information.

PRINCO **PRECISION THERMOMETER AND INSTRUMENT CO.**
PHONE: LOcust 3-6671
1434 Brandywine Street, Phila. 30, Pa.

Check 4366 opposite last page.



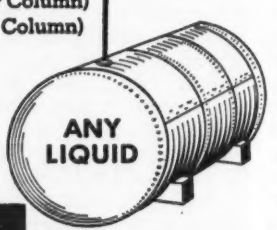
TANK-O-METER
FOR MEASURING TANK CONTENTS ANY DISTANCE AWAY

TANKS MAY BE...
• BURIED OR ELEVATED
• OPEN • CLOSED • VENTED
• UNDER PRESSURE • UNDER VACUUM
• UNDER PRESSURE AND VACUUM

ACCURATE • RELIABLE • DURABLE

Also gauges for:
Barometric Pressure (Mercury Column)
Absolute Pressure (Mercury Column)
Pressure and Vacuum
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Inclined Manometers
for draft, pressure or differential pressure.

SEND FOR BULLETINS



Uehling INSTRUMENT CO.
488 GETTY AVE.
PATERSON, N. J.
SINCE 1898

Check 4367 opposite last page.

Company Callers

From preceding page

sies in day-to-day contacts.

Here are some ways to improve, based not only on our experience, but on comments of other 'visitors.'

First, make sure your plant entrance or office reception room is a place of which you can be proud. After all, this is your showcase and reflects your company image. Have a telephone available for use of visitors. There's no objection to a pay telephone if that seems to be the best solution. A visitor doesn't mind paying for a call. What he does want is a place where he can make a call.

Next, choose and train your receptionists carefully so they greet visitors as though they were glad to see them. It is an excellent practice to notify the receptionist of visitors expected. Then, when the visitor arrives, the girl can say, "Oh yes, we have been expecting you." Visitors report that this one statement has created an extremely favorable impression on them immediately. The position of receptionist should be considered important.

The matter of telephone manners has been widely discussed but apparently not widely enough. Re-examine your telephone procedures: A magazine, "Better Business by Telephone," is published twice a month and contains valuable information.

American Cyanamid has drawn up a list of 16 rules of telephone etiquette which are extremely helpful. Cyanamid has also published other information on communications courtesy and your voice personality. The company has even prepared a 20-minute slide film, "The Connecting Link," on the proper use of the telephone.

One additional suggestion: Check your own habits on receiving visitors. You never know how important a visitor may be to you. Do you receive visitors the same way you would like to be received at other companies? Personal public relations is becoming more and more important. Your advancement, as well as that of your company, depends on it to a greater degree than many of us realize. ■

Plan your route now to process-analyzer safety

C. G. FELLOWS and L. J. ROGERS
Union Carbide Olefins Company
Division of Union Carbide Corporation

If your processing crystal ball reveals the upcoming installation of any process-stream analyzers, then right now is a good time to start thinking about designing-out explosion hazards. In discussing the possible methods, the authors draw upon years of experience with Union Carbide Olefin's Special Instrumentation Division

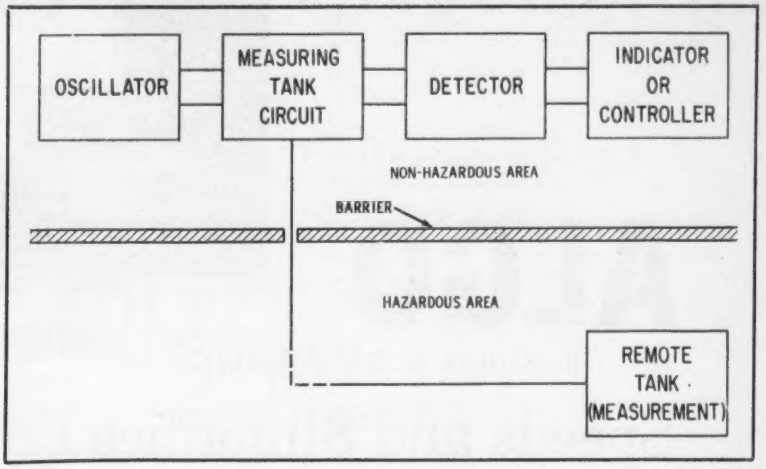


Fig. 1 Intrinsically safe design is illustrated here. Hazardous and non-hazardous areas are separated by a barrier. Only an intrinsically safe passive element is placed in the hazardous location

Elimination of explosion hazards in a process-stream analyzer can be accomplished in several ways. Most methods incorporate explosion-proof housings and/or those of the purged inert-atmosphere type. Each has advantages and disadvantages which determine its application "edge" for a given situation.

When an analyzer is explosion-proofed, it is completely enclosed in a housing so that the effects of any explosion will be retained within the housing.

Such housings have some limitations. They are by nature somewhat awkward and inaccessible. With some designs, whenever the housing is removed for servicing, the controlled temperature in the analytical section is lost. Several hours usually are required for it to be restored. There is nothing to prevent enclosing within the housing a corrosive atmosphere. This can result in contamination of the analyzer components, causing calibration shifting and/or other damaging effects.

If an analyzer is enclosed in an explosion-proof housing and an explosion occurs within it, the analyzer is virtually destroyed by the resulting fire and explosion. Operating-plant-unit shutdown might be necessary while the analyzer is being repaired or replaced.

Purging Presents Many Advantages

In contrast to the explosion-proof housing designed to contain an explosion occurring within its confines, the purged, vapor-tight inert-gas housing could not contain one if it occurred. It operates on the premise that the explosion is not permitted to take place.

With this approach, many liberties can be taken in providing for such things as accessibility of controls, meters and indicating lights, and visual inspection of components that would either be impractical or impossible with explosion-proof enclosures. For example, if common toggle switches, fuse posts, potentiometers or meters are mounted on a panel, then any inert-gas

To page 95

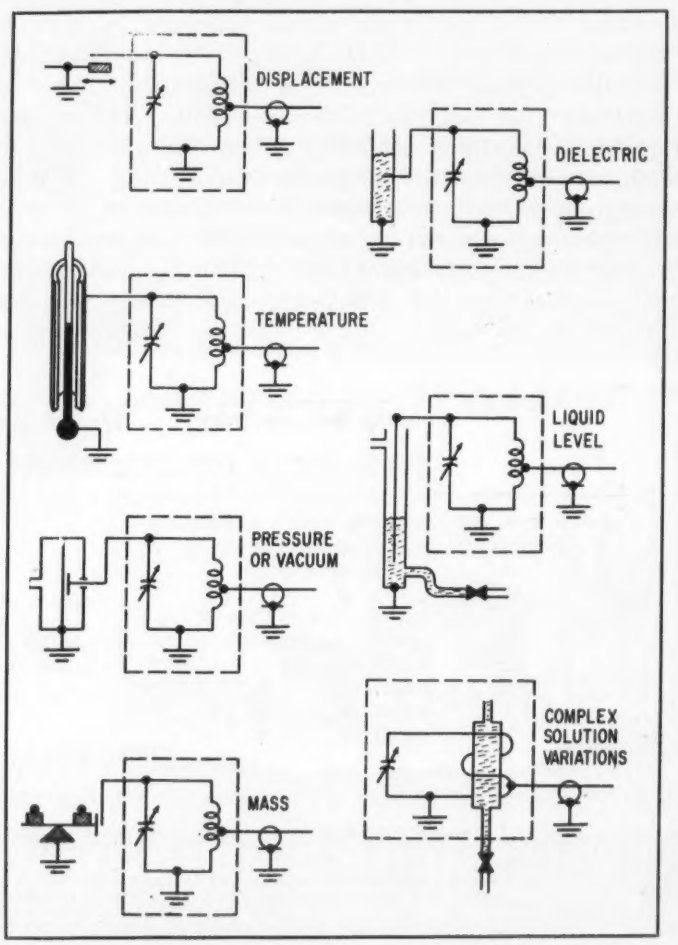
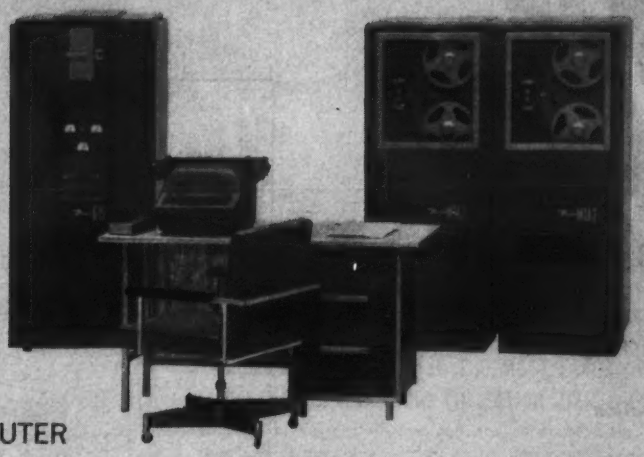


Fig. 2 Possible capacitance-parameter-measuring methods when using intrinsically safe techniques. Dotted lines suggest barriers to separate hazardous areas from non-hazardous

Did you see

. . . the beginning part of this Instrumentation Feature which starts on p. 33.

Several articles there discuss various aspects of the problems faced in computer-controlling an existing process.



ALGO*

FOR THE BENDIX G-15 COMPUTER

Speeds and Simplifies Problem Solving

ALGO extends the problem-solving horizon of every engineer, focusing the speed and precision of the Bendix G-15 computer on any algebraically stated problem. ● A true mathematical equation solver, ALGO permits any engineer or scientist to program the computer in universal mathematical language. No previous knowledge of computers or programming is needed. Input/output, computation and data handling are all automatically controlled by the G-15 computer. ● Compare the number of steps in the ALGO program illustrated below with the number required to solve the same problem on a slide rule, desk calculator or any other computing system. You will see the time and cost-saving significance of this new Bendix G-15 automatic programming aid. ● Specifically designed to take advantage of the computing power and flexibility of the proven G-15, ALGO is the newest addition to an extensive library of Bendix automatic programming systems. See how the low-cost Bendix G-15 and ALGO combine to broaden application boundaries. Learn how this powerful team can save you valuable time... and greatly simplify problem solving.

* AN ALGEBRAIC COMPILER BASED ON INTERNATIONAL ALGOL.

PROBLEM: $I = \frac{E}{\sqrt{R^2 + (6.2832\,FL - 1/6.2832\,FC)^2}}$

(For values of R,F & L as specified. For values of E ranging from 100 to 300 in increments of 50. For values of C ranging from .00002 to .000021 in increments of .0000001)

COMPLETE ALGO PROGRAM:

```
BEGIN ⑤
R = 10 ⑤
F = 60 ⑤
L = ₀2 ⑤
FOR E = 100(50)300 BEGIN ⑤
FOR C = ₀00002(₀0000001)₀000021 BEGIN ⑤
I = E/SQRT(R ↑ 2 + (6₀2832 * F * L — (1/(6₀2832 * F * C))) ↑ 2) ⑤
PRINT (FL) = E ⑤
PRINT (FL) = C ⑤
PRINT (FL) = I ⑤
```

Write on your letterhead for the self-teaching ALGO manual.

Bendix Computer Division
DEPT. Q-23 LOS ANGELES 45, CALIF.

THE Bendix CORPORATION

WHAT DO YOU THINK?

Opinions and comments on the significant subjects carried in each month's CHEMICAL PROCESSING are important! We *welcome* your letters expressing your views. Many CP readers are taking the opportunity to state their views on today's top questions. By publishing your letters in CHEMICAL PROCESSING, others will have the opportunity to hear your side.

Perhaps you agree

with what has been written in these articles.

Maybe you don't.

You might even have a thought or angle which wasn't expressed.
If so, why not let us and others hear your ideas? Suitable letters will be published in our regular "Letters from Readers" column. (See page 22.)
Address your comments to: The Editor CHEMICAL PROCESSING 111 E. Delaware Place, Chicago 11, Illinois.

For more information on product at left, specify 4368 see information request blank opposite last page.

Analyzer Safety

From page 93

leakage takes place from the inside out in a safe direction.

Purged housings tend to be much less cumbersome and awkward to mount than do the explosion-proof type, since they are smaller and lighter. The introduction of a clean dry gas inside the case prevents damage and equipment malfunction due to corrosive or damp evironmental atmospheres.

But Purging Has Limitations Too

There are drawbacks in the use of purged housings. Complexity is one. In order for such a housing to function properly, electrical interlocks, pressure monitors and judicious interconnections must be utilized. Because of the almost infinite variety of apparatus which can be enclosed, individual attention to the design of each installation is usually required. Such a condition in general defies the writing of standard specifications.

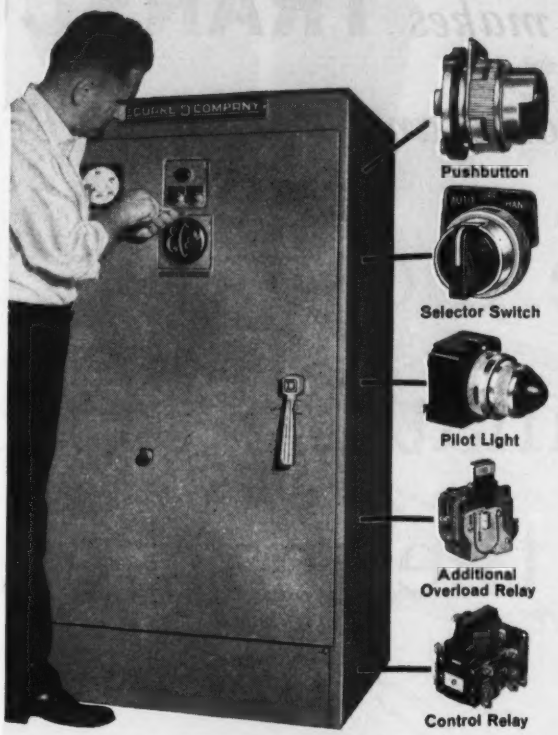
A danger of abuse is present when using a purged system. If one deals with an explosion-proof enclosure, it will successfully perform its function unless deliberately tampered with. However, purged housings by their very nature invite liberties. They *seem* so open and the contents are so similar to familiar laboratory apparatus that a relaxing of rigid field standards is tempting.

Explosion-proofing/Purging Combination Often An Answer

Of course, both explosion-proof and purged housings have their places. In many applications, it will be found that a marriage of the two systems is the optimum solution.

A good example of this is that of combustibles analyzers which involve analyses of process-stream samples. Most of these introduce into the analyzer housing continuously flowing samples of flammable or explosive character, such as

FAST DELIVERY of SIZE 6, 7 & 8 STARTERS

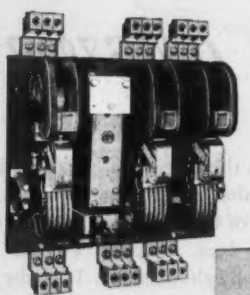


PRE-ENGINEERED MODIFICATIONS eliminate Special Engineering

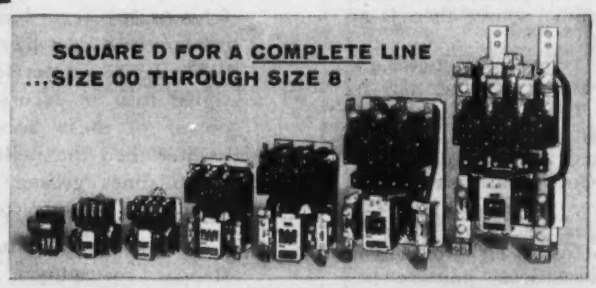
Square D NEMA Size 6, 7 and 8 magnetic starters are now built with a plate in the door to accommodate modifications when needed. The same modifications which have long been available on Square D starters through Size 5—pushbuttons, selector switches, pilot lights, additional overload relays, auxiliary contacts—can now be added to the larger starters without special engineering.

This means fast processing of your order, quick delivery of your starters. What's more, you can make the same modifications in the field. The wiring diagram shipped with each starter shows exactly how to do it.

Available in ratings up to 900 hp, Square D Size 6, 7 and 8 starters can be ordered as open devices, or in general purpose, dust-tight and water-tight enclosures.



• With Square D Size 6, 7 and 8 starters, you get DC-operated (self-contained DC supply) mill-type contactors—at no extra cost. Exclusive Line-Arc construction dissipates heat, provides longer contact life. Self-lubricating bearings plus simple design make maintenance extremely easy. Another standard feature is lugs which accommodate either copper or aluminum cable.



• The magnetic starters shown at right—which range from Size 00 through Size 5—plus the Size 6, 7 and 8 starters described above, add up to a *complete* Square D line for *any* AC motor application.

Write for Bulletin 8536. Square D Company, EC&M Division, 4500 Lee Road, Cleveland 28, Ohio

SQUARE D COMPANY
EC&M DIVISION • CLEVELAND 28, OHIO
wherever electricity is distributed and controlled

5291

Check 4369 opposite last page.

hydrocarbon gases.

This condition would seem to be incompatible with those set forth for safety. For here a hazardous atmosphere is deliberately introduced to the source of ignition, in the face of all of the efforts to prevent just such a combination. In such cases, the electrical and analytical portions of the instruments can be separated into two adjacent housings.

A specific example of this was a vapor-fraction analyzer. In it all of the sample flow system — heat exchangers, carrier gas flow control components, valves, separating columns and other assorted hardware — have been placed in a rear housing. The only electrical elements involved are a case heater and detector cell, both of which were fabricated as explosion-proof elements. The front case contains all the remaining electrical and electronic components, of which there are many. These are enclosed in a purged housing wherein no sample gases are introduced.

Intrinsically Safe Techniques

Suggestions have been made to safely put up with existing hazardous measuring systems and contain them in various ways. However, elimination of the ignition source by employing an intrinsically safe electrical system further simplifies the problem. Without the ignition source there is no hazard.

Fig. 1 (page 93) shows one such method that may be used. The barrier represents separation between a hazardous and non-hazardous location. Only a intrinsically safe passive element is placed in the hazardous area—one that cannot cause an explosion of the hazardous mixture because the available energy is to low (below 2.4×10^{-5} joules for a hydrogen-air mixture).

In this system, no precautions need to be taken at the site of measurement other than those required for simple mechanical protection or for corrosion resistance. Various

What makes **TRANSCOPE®**

Electronic and Pneumatic Recorders

the most wanted miniature instruments on the market today?

...The answer is **SERVO**

In the past 2 years thousands of Servomatic motors have proven the inherent advantages of this Taylor innovation. Heart of the 90J (pneumatic) and 700J (electronic) recorders, it puts TRANSCOPE Recorders in a class by themselves. It is the most reliable device yet developed for converting an input signal into an accurate record. The tremendous power of these Servomatic motors—150 times greater than the bellows type (pneumatic), over 1,000 times greater than galvanometer systems (electronic)—gives you all these advantages:

- Greater accuracy than ever before—½ of 1% in standard instruments, ¼ of 1% optional.
- Threshold sensitivity of 0.1% to input signal.
- 3 months' ink supply mounted on the pen—no troublesome capillary.
- Lifetime recording accuracy—no critical pen pressure.
- No flimsy linkages and levers.
- Truly rectilinear chart—no curved time lines.

Plus these optional features: alarm contacts – retransmitting potentiometer—function generation —digital output with encoder discs.

* * *

Ask your Taylor Field Engineer for full details of all the many superior features of TRANSCOPE servo-operated recorders. Or write for Bulletin 98286 (pneumatic) or 98335 (electronic). Taylor Instrument Companies, Rochester, New York, or Toronto, Ontario.

See it demonstrated at the ISA Show, Booths 1432-36; 1531-35

methods have been proposed in accomplishing this measurement. Fig. 2 diagrams a few possibilities when using the capacitance parameter measurement.

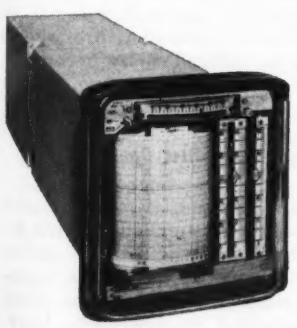
The principal limitation of such intrinsically safe systems is that the measurement must be reducible to conform to the method used—capacitance variation in our example. Also, whatever varies the capacitance as a function of the desired variable is usually also influenced by ambient-condition variations yielding drifts (notably temperature). Finally, a remote-sensing unit must be employed at the measurement site for the parameter conversion. There may not always be room for this piece of equipment. ■



700J (electronic) servo motor is 2 phase, size 15, 60 cycle, 117 volt—built to military specifications.

POWER

Other TRANSCOPE advantages:

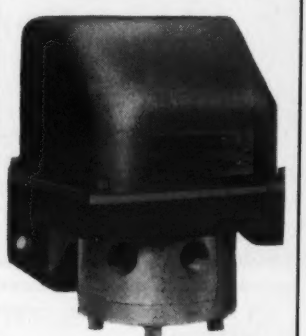


- Unconfused readability—because chart record, pen and set-point are side-by-side.
- 4″ chart reads from left to right—on rectilinear coordinates.
- Controller response adjustments may be made from the front—you can watch the results.
- Separate Plug-in Set Point Transmitters permit staying on automatic control—even when recorder slide is removed.
- All principal assemblies are plug-in mounted for flexibility and accessibility.
- Plug-in recorders and controllers permit housings to be shipped 4-6 weeks earlier than completed instruments to enable you to make all necessary connections to tagged manifolds.

Recorders of the future will have SERVO POWER . . . TAYLOR has it NOW!

Taylor Instruments **MEAN ACCURACY FIRST**

Check 4370 opposite last page.



Pressure-difference tale

. . . is told by transmitters applicable for flow and differential-pressure measurement and transmission.

Differential pressures are detected in sensing capsule. Slug secured to capsule is magnetically coupled to linear differential transformer. Because slug is linked magnetically with windings, all hydraulic pressures are contained in heavy-walled structure. There is no need for special seals.

Standard model measures from zero to 80″ of water directly. Span can be adjusted to provide full output signal over upper 30% of this range. Units are also available to measure differentials to 220 psi.

(Differential pressure transmitter BB-25 is product of Consolidated Controls Corporation, Bethel, Conn.)

Check 4371 opposite last page.

Keeps your men dry and comfortable ... come hail or high water!



Light, flexible North PVC wet-weather clothing

For head-to-toe protection against wind, rain and sleet, outfit your men in North PVC foul-weather gear by Jomac. It's rugged as all get-out: coated on both sides, with all points of strain reinforced and all seams completely sealed by electronic welding. Yet it's light and flexible ... and the jackets have set-in sleeve design and generous cut that allow full freedom of motion. It's safer: comes in a bright "safety" yellow for maximum visibility. And it lasts: will not crack, flake or peel, in use or in storage ... extremely resistant to abrasion and snagging ... wonderfully easy to wash. Write for literature!

Welded Seams

Seams are stitched with synthetic thread, then shielded and electronically welded for maximum strength and protection. In addition, buttons are electronically welded in place.

Also ask about our complete line of North PVC coated gloves and chemical-resistant clothing

JOMAC

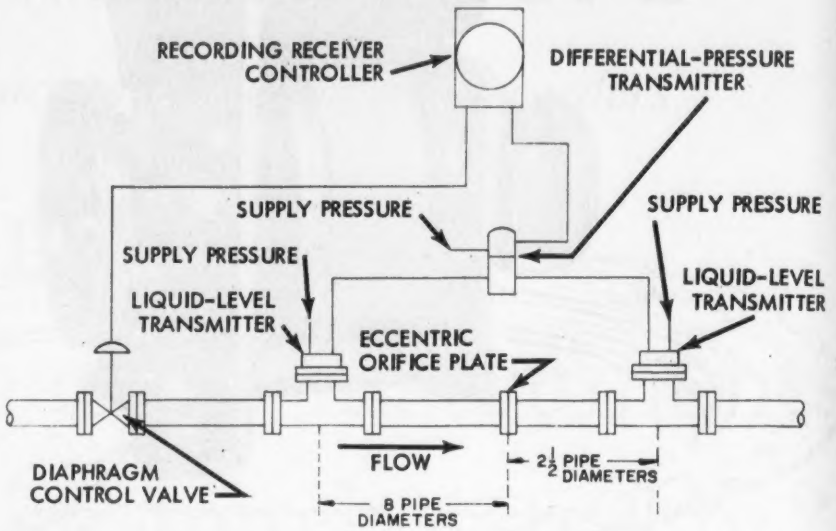
JOMAC Inc., Dept. N
Philadelphia 38, Pennsylvania

"Jomac Sells Quality ... and Quality Sells Jomac!"

Check 4372 opposite last page.

CHEMICAL PROCESSING Process & Laboratory INSTRUMENTATION 6th Annual Feature

Titanium-dioxide Flow-measurement System



Flow of ornery TiO_2 slurry measured without maintenance for six months

Installation saves $150 over previous system used

Trouble-free flow measurement of corrosive titanium-dioxide slurry has been experienced for six months in a recent titanium-plant installation. A cost-savings bonus of $150 was also realized in the instrumentation project.

Keys to success in this set-up (diagrammed above) are two pressure transmitters which have proved more than capable of coping with corrosive and somewhat erosive slurry. The hard-to-handle TiO_2 comes in contact with only the diaphragm, gasket and diaphragm ring of each pneumatic transmitter.

Eccentric Orifice Plate Skirts Deposit Build-up

In flow-measurement system, one pressure transmitter is eight pipe diameters upstream from eccentric orifice plate, while second is 2½ pipe-diameters downstream from plate. This type orifice is used to prevent deposit build-up below hole in plate.

Output pressures of both transmitters are fed into a differential-pressure cell. This cell senses received outputs and transmits standard pneumatic signal to recording receiver-controller. From here, slurry flow is controlled by means of pneumatic actuation of diaphragm control valve.

Pressure-transmitter Operation

In pressure transmitter of type used here, TiO_2 slurry is supplied through inlet connection and adjustable orifice. Force thus exerted on diaphragm is opposed by transmitted air pressure. Bleed orifice is provided in diaphragm block. Air-flow rate into transmitter equals that out the bleed when diaphragm is in equilibrium.

Increasing flow rate produces corresponding increase in measured pressure. This moves diaphragm towards bleed orifice, thus restricting air flow to atmosphere. (With decreasing flow rate, reverse takes place.)

Supply air continues to enter unit,

causing build-up in transmitted pressure until it is equal to head pressure. Diaphragm is forced away from orifice by increased transmitted pressure. This precludes further build-up and unit again goes into equilibrium.

$150 Bonus Plus . . .

System previously used to measure TiO_2-slurry flow incorporated a diaphragm-seal liquid-filled-type differential-pressure cell. This particular unit was subject to ambient-temperature changes. Also, approximately $150 was saved by using less-expensive transmitters described above.

Cost saving, however, was not the major benefit in this installation. The six-month maintenance-free period experienced to date has proved worth of system to user. During periodic shutdowns, no wear has been detected on diaphragms.

(Pressure transmitter 115 is specified in four-page Bul F-115—Fisher Governor Company, Marshalltown, Iowa.)

Check 4373 opposite last page.

Transducer output tailored for computer consumption

Uses: Conversion of pneumatic input to electrical output.

Features: Transducer output has characteristics desirable in computer-input signal. This includes high-level voltage, minimum AC ripple, isolation from ground and minimum capacities coupling to any AC lines or ground.

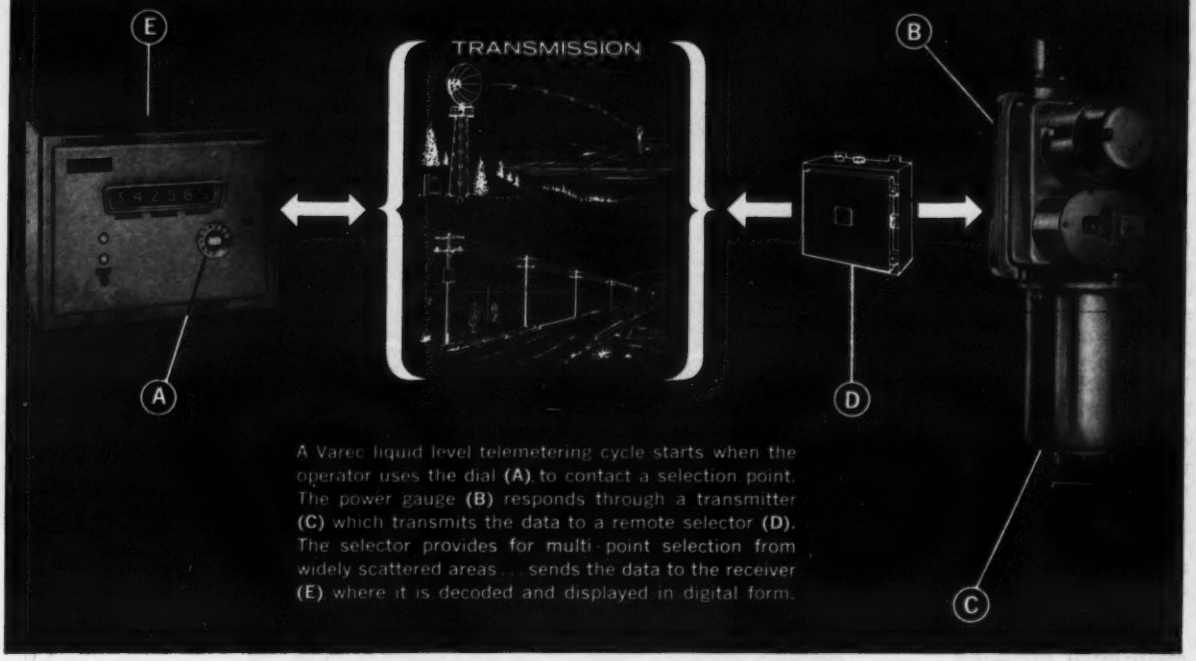
Description: Transducer consists of servo motor driving potentiometer mounted on common bracket. Unit has pneumatic zero and span adjustments and optional electric-span adjustment.

(Transcope 710 T Servomatic transducer is reviewed in Bul 98375 — The Taylor Instrument Companies, 95 Ames St., Rochester 1, New York.)

Check 4374 opposite last page.

VAREC PULSE CODE POWER GAUGE SYSTEM

ACCURACY-TO 1/16 INCH OR BETTER IN GAUGING AND TELEMETERING LIQUID LEVEL DATA



A Varec liquid level telemetering cycle starts when the operator uses the dial **(A)** to contact a selection point. The power gauge **(B)** responds through a transmitter **(C)** which transmits the data to a remote selector **(D)**. The selector provides for multi-point selection from widely scattered areas . . . sends the data to the receiver **(E)** where it is decoded and displayed in digital form.

Varec combines its new DYNAMATIC* 8400 Series Power Driven Tank Gauge with the Varec Pulse Code to provide an accurate, reliable liquid level measurement/telemetering system. The new system transmits data 'error-proof' over a single communications channel . . . gives a reading accurate to 1/16 inch in just 5 seconds.

Varec's pulse code method of dots and dashes supplies a fast reading with a slow pulse rate of 5 pulses per second so the transmission channel is not critical. Wiring costs are reduced with a single transmission circuit between the remote selector and receiver. (For smaller installations, a direct-wired system can be used instead of selectors.)

Standard receivers are available in capacities of 10, 100, or 1000 point selection.

ONLY THE **VAREC** SYSTEM OFFERS ALL THESE ADVANTAGES:

ACCURACY: Provides 1/16 in. gauging accuracy with new Power Driven Tank Gauge . . . transmits 'error-proof' reading by pulse code.

RELIABILITY: Consists of simple, compact electro-mechanical components . . . needs no vacuum tubes or other complex electronic equipment.

FLEXIBILITY: Designed on a building block principle that permits unlimited variety of system arrangements such as telemetering other measurements . . . or adding remote control, data logging and alarm systems.

ECONOMY: Requires just a simple transmission circuit . . . a metallic pair or a carrier derived channel operated over existing lines or microwave. Costs little more than conventional systems.

EXPERIENCE: This highly accurate, reliable liquid level measurement/telemetering system offered by Varec, pioneers in the gauging field . . . over six years experience in pulse code applications.

For complete information, write for Bulletin CP 3707, Dept. CP-1224-1. See spread on following pages.

"Varec" TRADE ● MARK

*Trademark

THE VAPOR RECOVERY SYSTEMS COMPANY
2820 North Alameda Street • Compton, California
Branches and Representatives in Principal Cities

Check 4375 opposite last page.

Radical range changes pose no problem for refractometer

Uses: Continuous measurement and control of organic and inorganic liquids.

Features: Measurement of ranges as narrow as 0 to 1%, and as broad as 0 to 100% can be handled.

Description: Process refractometer employs principle of measurement of variations in refractive indices between substance analyzed and constant standard. In unit, provision has been made for handling of suppressed-zero ranges with accuracy of 1% within narrow limits.

Refractometer can be readily converted in field from one problem to another or from one range to another of same substance. Readings can be obtained of 90% of full-scale deflection within 30 to 60 sec. Unit can be obtained in explosion-proof cases.

(Process refractometer is product of Mine Safety Appliances Company, 201 N. Braddock Ave., Pittsburgh 8, Pennsylvania.)

Check 4376 opposite last page.

Multi-point sampling of heater efficiency proves worth

Problem: An index of combustion efficiency was desired for oil heaters in a Texas refinery to preclude excessive natural-gas use. Refinery uses waste refinery gas supplemented with natural gas to fire the oil heaters.

Rate of oil flow through heaters is normally held constant. Firing rate is controlled to maintain even oil-outlet temperature. It is important that waste gas be burned as economically as possible, so minimum of comparatively expensive natural gas is consumed. Economically, however, it was difficult to justify gas analyzer and recorder for each heater.

Solution: A multi-point sampling system and oxygen analyzer-recorder for fire heaters was installed. Timer inside





Varec Pulse Code Telemetering Systems and automatic tank gauging equipment are fully described and illustrated in our Bulletin No. CP-3707. For immediate information or qualified engineering consultation, contact any of the Varec branch offices.

"VISIT VAREC BOOTHS 539 AND 540, 15TH ANNUAL I.S.A. INSTRUMENT-AUTOMATION CONFERENCE AND EXHIBIT BEING HELD AT THE NEW YORK COLISEUM SEPTEMBER 26-30."

"Varec" TRADE ® MARK

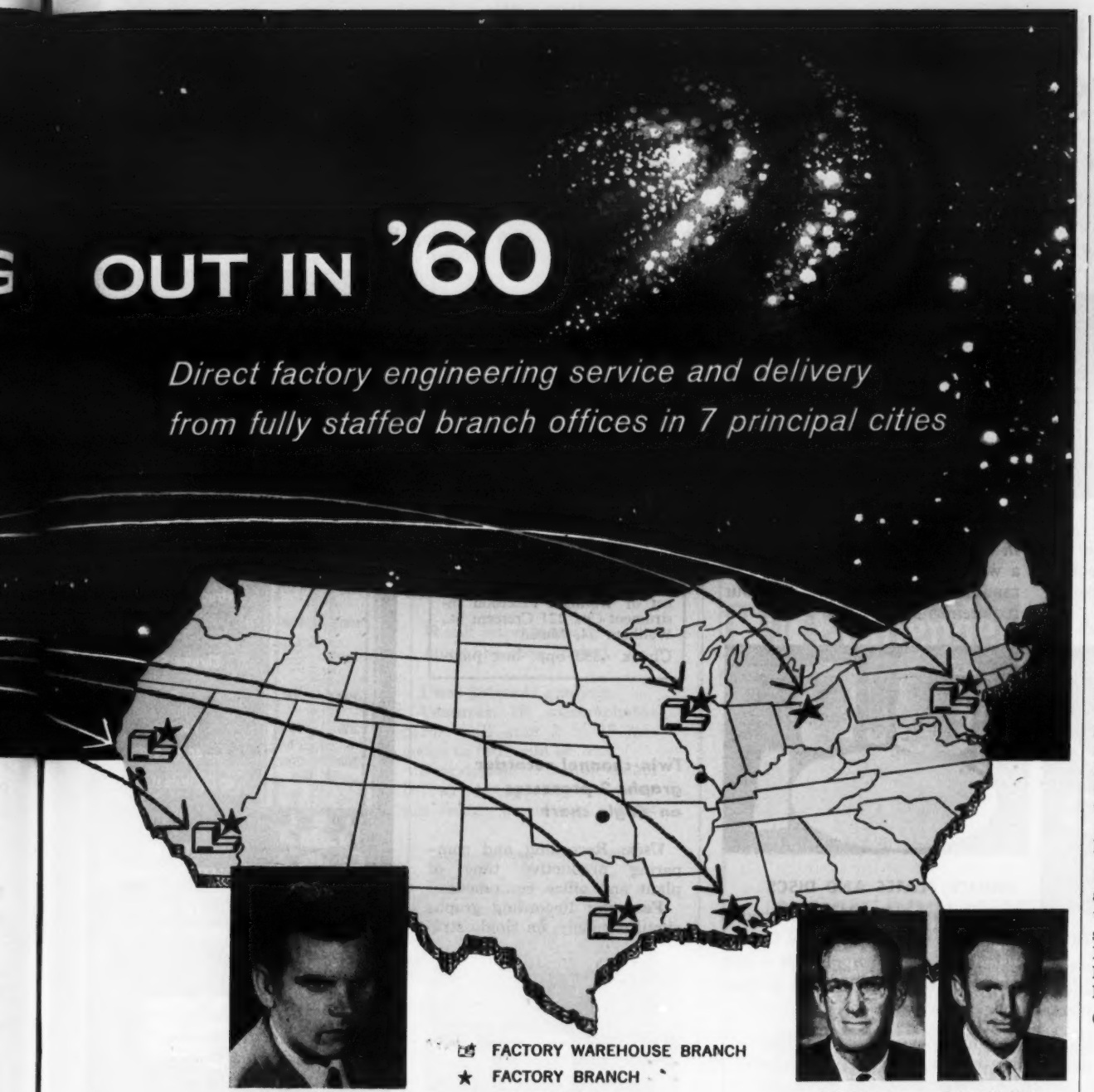
On-the-spot engineering and consultation services on Varec telemetering and gauging equipment is now as near as your phone. Through a newly established network of seven Varec branch offices and the strategic locations of new Varec warehouses, immediate delivery and service on all Varec products and parts is now assured. Manned by factory-trained electro-mechanical engineers, Branch offices have direct communication with the Varec home office via TWX and TELEFAX. These new, fully-staffed and fully-stocked branch offices guarantee close contact and service for Varec customers, when and where they need it.

For today's need and tomorrow's, Varec Pulse Code Telemetering Systems, combined with Varec tank gauging equipment, are the fastest and most accurate means of measuring tank liquid level, temperature and volume, and actuating remote equipment. Within five seconds, Varec Pulse Code Telemetering Systems gather information from tanks a hundred feet or hundreds of miles distant for immediate and permanent records and direct readings. No other systems offer the economy, freedom from error, and reliability that Varec provides.

THE VAPOR RECOVERY SYSTEMS COMPANY
2820 North Alameda Street, Compton, California

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Direct factory engineering service and delivery from fully staffed branch offices in 7 principal cities



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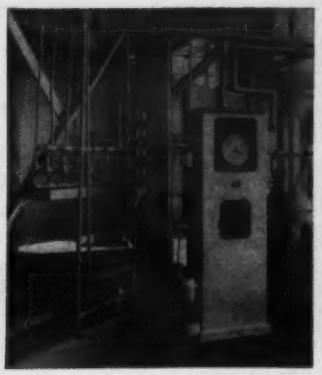


James R. Thompson
District Manager
New Orleans, La.



James E. Collins
Reg. Manager, Gulf Coast
Houston, Texas

Check 4377 opposite last page.



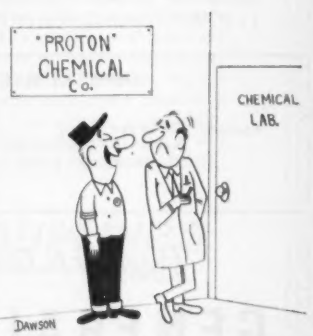
Multi-point sampling system and oxygen analyzer recorder are keeping burning of natural gas in oil heaters at minimum for Texas refinery

panel on which analyzer and recorder are mounted causes gas to be sampled from each point on hourly basis. Two pen recorders show both point being sampled and percent-by-volume oxygen content of gas at that point.

Results: Multi-point sampling arrangement is proving to be economical method of monitoring combustion efficiency of gas-fired oil heaters. It has resulted in reduction of amount of natural gas needed, while also keeping cost per analyzed point at a reasonable level.

(Multi-point sampling system and oxygen analyzer-recorder utilized in this installation are subjects of Buls E65-6 and E65-2, respectively — Bailey Meter Company, 1050 Ivanhoe Rd., Cleveland 10, Ohio.)

Check 4378 opposite last page.

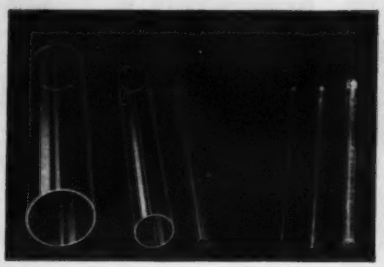


"Nuclear fission sounds interesting — just what do you use for bait?"

NOW! ALL YOUR FUSED QUARTZ REQUIREMENTS FROM 1 SOURCE

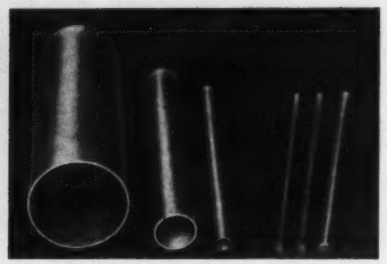
We manufacture *and stock* a complete range of:

STANDARD TAPER JOINTS • BALL AND SOCKET JOINTS
CAPILLARY TUBING • COMBUSTION TUBES • DOUBLE BORE TUBING
PRECISION BORE TUBING • LABORATORY QUARTZWARE



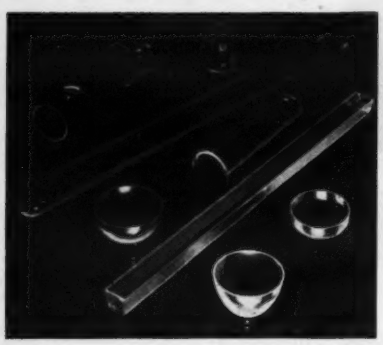
CLEAR TUBING AND ROD

Can be secured from stock in a complete range of sizes—special sizes also avialable to meet your exact specifications.



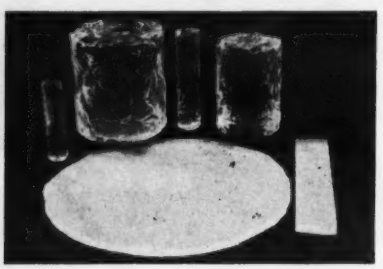
TRANSLUCENT TUBING AND ROD

In stock for immediate delivery in a wide range of sizes. Available in random or cut lengths to fit your requirements.



FUSED QUARTZ COMPONENTS

High purity—in stock in a wide variety of high purity crucibles, boats, test tubes and furnace tubes.



INGOTS, PLATES AND DISCS

Rough cut *or* ground and polished in diameters up to 18½ inches. Lenses, windows, prisms supplied *in a wide range of sizes*—or finished to your own particular needs.

FREE BROCHURE. New 40-page brochure contains latest information on physical properties and transmission characteristics, plus complete prices. For this, or engineering assistance, write the G-E Willoughby Quartz Plant (see "Midwestern" address below).

GENERAL ELECTRIC DISTRICT SALES OFFICES

Eastern: 744 Broad Street, Newark 2, New Jersey, Phone: MArket 3-3953

Midwestern: Euclid Ave. and Campbell Road, Dept. CP-90, Willoughby, Ohio, Phone: WHitehall 2-9300

Western: 2747 South Malt Avenue, Los Angeles 22, California, Phone: RAymond 3-2541

Progress Is Our Most Important Product

GENERAL ELECTRIC

Check 4379 opposite last page.



Time won't fly

. . . without being measured with this elapsed-time indicator featuring digital readout. Unit provides continuous record of operational use and life, which is applicable for reliability programs and life testing, design and systems analysis and utilization studies.

Time indicator weighs 3-¾ oz, measures 1-1/6″ OD x 2-¾″ max. It operates at 360 to 440 cps with 2-½ max-power input. Digital presentation runs to 9999 hr and numerals are 5/32″ high.

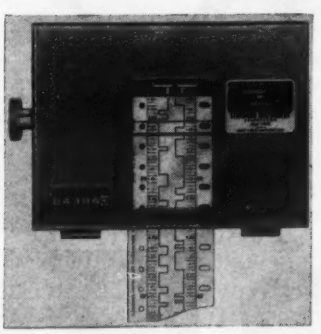
(Elapsed-time indicator is product of Waltham Precision Instrument Co., 221 Crescent St., Waltham 54, Mass.)

Check 4380 opp. last page.

Twin-channel recorder graphs 2 processes on single chart

Uses: Recording and comparing productive time of plant and office equipment.

Features: Recording graphs simultaneously, on single strip



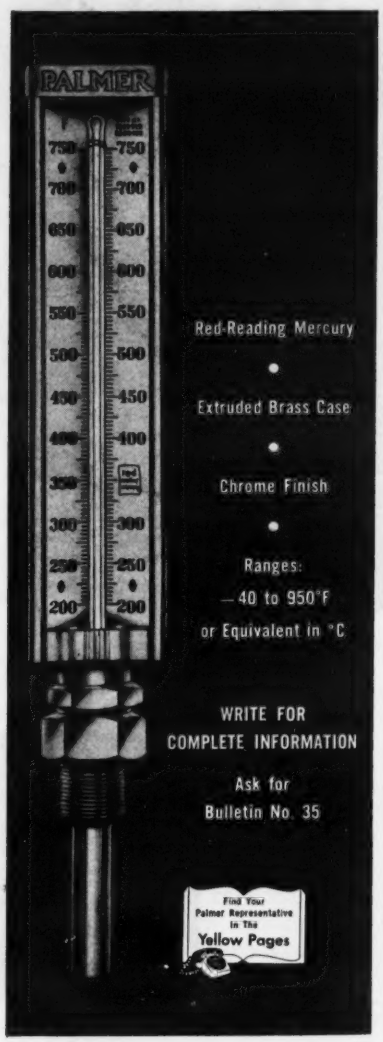
In two-channel time recorder, chronologically printed strip chart moves at constant rate through instrument

chart, operating patterns of two machines, two functions of same machine or any two processes. It may be connected to distinguish between

TODAY'S MODERN INDUSTRY DEMANDS A MODERN THERMOMETER

PALMER

RED-READING MERCURY THERMOMETERS



PALMER

PALMER THERMOMETERS, INC.

Mfrs. of Industrial Laboratory, Recording and Dial Thermometers • Cincinnati 12, Ohio

Check 4381 opposite last page.

actual productive time and non-productive idling time. Time totalizer continuously furnishes visual sum of productive time in hours and tenths, or minutes and tenths.

Description: In operation, two-channel time recorder chronologically printed strip chart moves at constant rate through instrument. Two styli continuously scribe tape, marking ON-OFF operation of machines to which they are wired. Standard chart roll speed are 1, 4, 12 and 60" per hour. Slower charts run as long as four months without change.

(Two-channel time recorder is product of Standard Instrument Corp., 657 Broadway, New York 12, N.Y.)

Check 4382 opposite last page.

Photoelectric comparator in colorimetric analyzer

Uses: On-stream monitoring of hardness, residual chlorine or phosphates.

Features: Colorimetric analyzer incorporates photoelectric comparator.

Description: Analyzer automatically monitors streams 24 hr/day. Accuracy ranges are 0 to 3 ppm (hardness); 0 to 1 ppm (residual chlorine); 0 to 30 ppm (residual phosphates).

In addition to photoelectric comparator, analyzer contains indexing motor to proportions 0 to 7 cc reagent feed with fixed sample volume at variable intervals. It also includes indicator with alarm contact which is adjustable over full span of standard ranges.

(Chemalyzer is covered in Bul 858-1—Milton Roy Company, 1300 E. Mermaid Lane, Philadelphia 18, Pa.)

Check 4383 opposite last page.

Key to standardization in pressure-temp recorder is constant voltage

Uses: Pressure and temperature recording.

Features: Recorder is self-contained and utilizes constant voltage source instead of conventional standard cell for standardization.

Description: Electronic potentiometer recorder can handle one or more points of pressure and 23 points of temperature. Standard unit has temperature and pressure ranges of 0 to 800°F, and 0 to 10,000 psig. Zero and span adjustments are provided for pressure range of instrument. This is independent of temperature range.

(Pressure-temperature recorder is detailed in Bul F-9789 — Wheelco Instruments Division, Barber-Colman Company, Rockford, Ill.)

Check 4384 opposite last page.

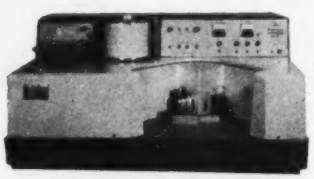
Two to sixteen microns scanned in four min with spectrophotometer

IR unit incorporates automatic scan control

Uses: Infrared analysis.

Features: IR spectrophotometer will scan 2 to 16 microns in four min or less.

Description: Double-beam infrared spectrophotometer has design permitting variety



Spectrophotometer design permits variety of accessories to broaden capabilities

of accessories which broaden its capabilities. Available attachments allow wavelengths from 0.2 to 38 microns.

Large sampling area permits easy use of available accessories and attachments which include 20-meter gas cell, ultra-micro liquid and gas cells and micro-beam condensing system.

(Infrared spectrophotometer NK-1 is product of Spectnochemical Division, Baird-Atomic, Inc., 33 University Rd., Cambridge 38, Mass.)

Check 4385 opposite last page.

NOW! accurately forecast and record plastic properties of materials to 1150°F.



C. W. BRABENDER PLASTICORDER

This high temperature recording plasticimeter incorporates the time-proven, C. W. BRABENDER PLASTOGRAPH and a measuring head of unique design with a vertical mixing chamber and shaft. Temperature uniformity is guaranteed at programmed rate of change or at constant temperatures from 575° to 1150°F. The C.W.B. PLASTICORDER accurately forecasts processability and records plastic flow of all materials at various shear rates under typical processing conditions. Control is maintained from a separate console.

SEE FOR YOURSELF! Bring or send us your samples for free testing. Write for technical application bulletins.

C.W. Brabender Instruments, Inc.

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BOOTH 112
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STATLER-HILTON, NEW YORK CITY

55 E. WESLEY ST.,
S. HACKENSACK, N.J.
DIAMOND 3-8425

Check 4386 opposite last page.

Don't take chances on couplings



CHECK PUBLISHED MISALIGNMENT RATINGS BEFORE YOU BUY

Since misalignment is the basic problem that shaft couplings are designed to solve you'll find a published conservative misalignment rating (along with load capacity rating) for every Fast's Coupling. Compare it with the misalignment rating of any other coupling you are considering.

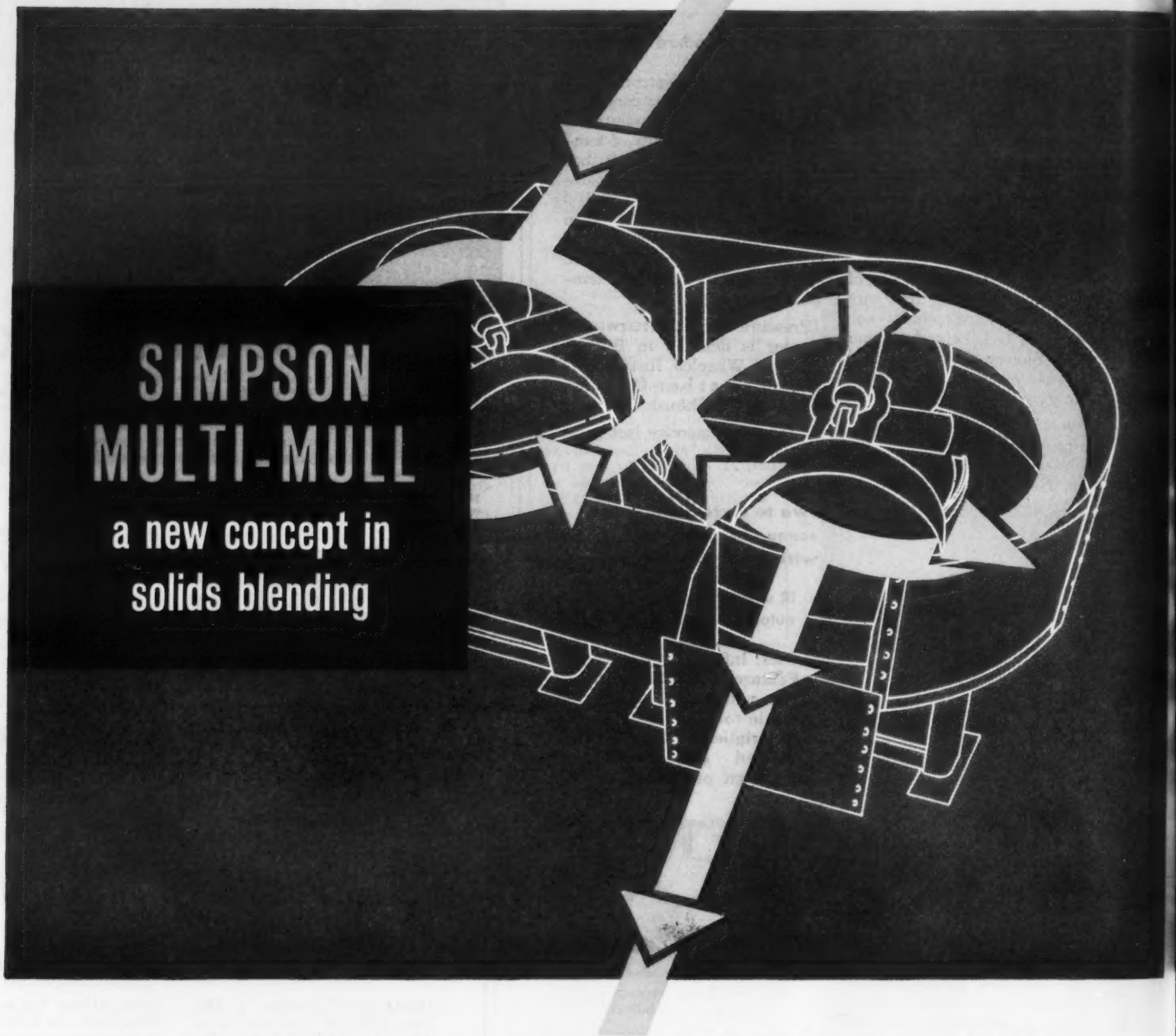
One further advantage of Fast's Couplings' misalignment ratings: You save money on installation because, knowing the ratings, you don't have to line up driving and driven elements with pinpoint accuracy. It's one more important reason why Fast's Couplings are the choice of more equipment manufacturers than any other gear-type coupling.

KOPPERS COMPANY, INC., 1709 Scott Street, Baltimore 3, Md.

KOPPERS FAST'S COUPLINGS
Engineered Products Sold with Service

Check 4387 opposite last page.

MIX-MULLER® introduces a new era in mixing



Controlled Dispersion breaks production barriers

The era of continuous mulling is here, now. The new Simpson *Multi-Mull* is specifically designed to deliver the quality of prepared material, which can be achieved only through mulling . . . in continuous high production quantities.

This means that many processors can take advantage of the benefits of controlled dispersion for the first time. It also means that many muller users can look forward to greatly increased mixing capacity and the elimination of many labor and equipment problems involved with batch-type operations.

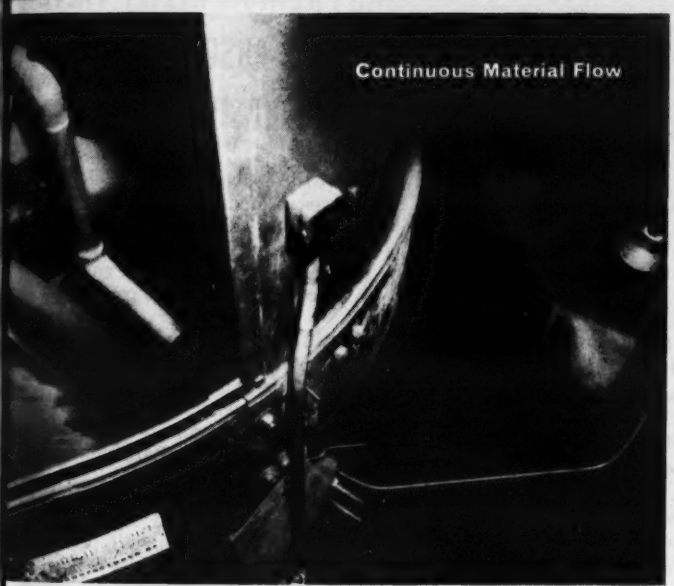
No cure-all, *Multi-Mull* is being introduced to do *certain* mixing jobs better and faster than they have ever been done before . . . under a performance guarantee*. A full line of models ranging in pan retention capacities of from 6 to over 120 cu. ft. is available.

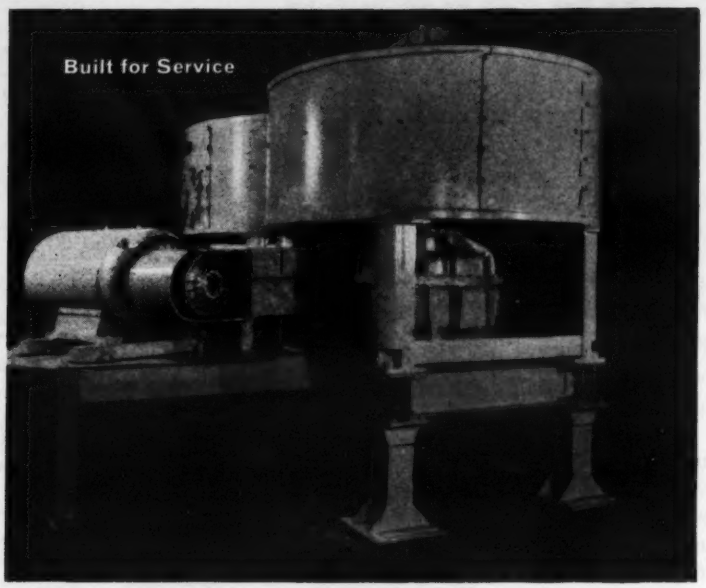
A new bulletin describes *Multi-Mull.* Write for your copy.

with a full line of CONTINUOUS MULLERS









Advantages: Continuous Controlled Dispersion:
• No need for batch accumulating or storage components • Large capacity in small floor space • Absolute moisture control • Little operator attention • Only equipment of its type available • Mix-Muller quality—in continuous quantities • Low equipment cost per ton of prepared material • Backed by performance guarantee • Handles: solid/solids, dry/solids, wetted/solids

***Multi-Mull Performance Guarantee . . .** we will test the mulling characteristics of your material in a pilot unit. When you are satisfied with the quality of prepared material, we will specify equipment to match your production requirements. National Engineering Company will then build it, install it and not leave your plant until Multi-Mull satisfies the terms of the mutual agreement.





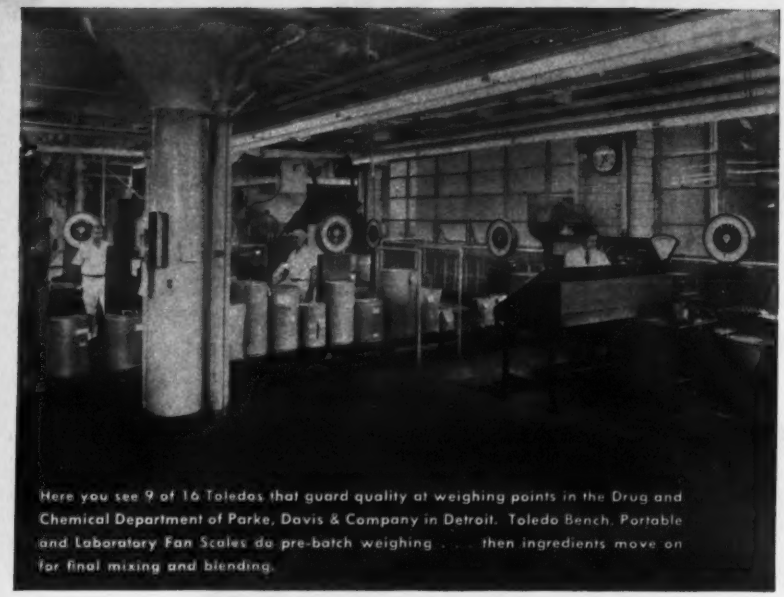
Write for Literature

Nothing Mulls like a MULLER

1280

SIMPSON *MIX-MULLER*® DIVISION
NATIONAL ENGINEERING COMPANY
640 Machinery Hall Bldg., Chicago 6, Illinois

For more information on product at left, specify 4388 see information request blank opposite last page.



Here you see 9 of 16 Toledos that guard quality at weighing points in the Drug and Chemical Department of Parke, Davis & Company in Detroit. Toledo Bench, Portable and Laboratory Fan Scales do pre-batch weighing . . . . then ingredients move on for final mixing and blending.

TOLEDO SCALES

meet PARKE, DAVIS & COMPANY'S *Critical Standards . . .*

Parke, Davis & Company brings to doctors and patients wonders in the world of medicine . . . products that help extend the span of human life . . . alleviate suffering . . . and thwart sickness and disease. It's a 94-year tradition at Parke, Davis & Company to keep going forward — in research and in methods and equipment used in their laboratories.

You'll see evidence of this company's progress in the choice of modern Toledos for fast, accurate control at weighing points. Putting Toledos in these vital jobs of weight-control assures that right amounts of drugs and chemicals go into each carefully determined formula — every time!

Let us show you how modern Toledos will fit your needs equally well — whatever your weighing problem. Write today for new Condensed Catalog 2001.



● Toledo Model 2282 Suspended Platform Scale weighs drug materials going into batches in the Crude Drug Milling Section of the Extract Department.

TOLEDO SCALE, TOLEDO 12, OHIO
Division of TOLEDO SCALE CORPORATION
(Toledo Scale Company of Canada, Ltd., Windsor, Ont.)

SERVICE Factory-Trained 300 Cities

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Weight-printing Scales • Motor Truck Scales • Automatic Batch Controls • Bulk Weighers • Automatic Check Weighers • Electronic Load Cell Scales • Counting Scales • Mailing and Parcel Post Scales

Headquarters for Weighing Systems

Check 4389 opposite last page.

If variable deviates, transducer trips alarm

Digital-transducer may be optionally equipped with deviation or upset alarm detector. Deviation alarm alerts operator in event measured variable changes from normal or previous magnitude. Upset alarm operates similarly, warning operator should rate at which variable changes exceed preset limits.

Tranducers will measure pressure, flow, temperature or other variables to provide digital output in form of contact closures for data recording or transmission.

Transducers are completely mechanical and employ mechanical force amplifiers to drive shaft-position encoders from bourdon tubes, bellows, diaphragms or similar devices. Explosion-proof units may be obtained.

(Digital transducers are specified in detail in Bul 150—Datex Corporation, 1307 S. Myrtle Ave., Monrovia, Calif.)

Check 4390 opposite last page.

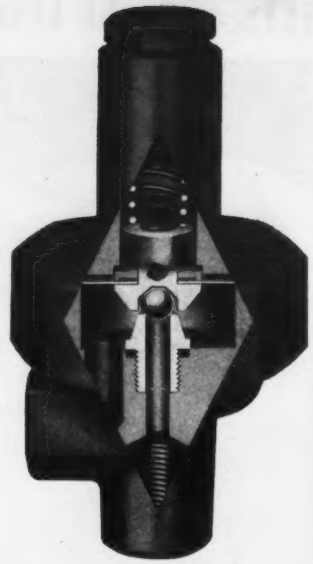
Fast response achieved by electronic control on metering pump

Trio of controls are offered for feeding unit

Electronic controls have been incorporated in a metering-pump line. Three different controls have been offered: combination electro-pneumatic which uses air for power only, all-electric and electro-hydraulic.

Pumps are of positive displacement type. Reciprocating piston within pump forces oil to move diaphragm forward and back. Backstroke takes liquid chemical into reagent head through suction check valves. Liquid is forced through discharge valves on forward stroke.

Diaphragm isolates chemical being pumped to area within reagent head plate and check valve—consequently, no other parts need be of chemically stable material. Piston design



THIS PREMIUM RELIEF VALVE PROVIDES ABSOLUTE SAFETY IN CORROSIVE SERVICE

- The Milton Roy full-lift design assures immediate and positive relief when the set pressure is reached, yet there's no chattering or leakage as the relief valve approaches its set pressure.
- Continued leak-free operation is assured even after the valve has opened in corrosive service, because topworks are completely isolated from the process stream by a Teflon diaphragm.
- Wetted parts are available in steel, 316 stainless, Carpenter 20 stainless, Hastelloy "C" or "B", or PVC. Sizes range from ¼" up for pressures to 1500 psi. Back pressure valves are also available.

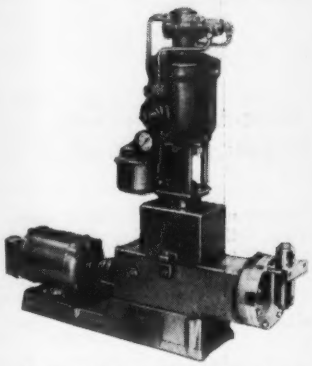
For complete information, request Bulletin 357-2 from Milton Roy Co., 1300 East Mermaid Lane, Philadelphia 18, Pennsylvania.

milton Roy
CHEMICAL INSTRUMENTATION SYSTEMS

Controlled Volume Pumps • Quantichem Analyzers
Chemical Feed Systems • pH Instruments

Check 4391 opposite last page.

does not incorporate stuffing box since only oil is handled. If leak exists, oil is automat-



Electronically controlled metering pump shown here incorporates electro-pneumatic actuator

ically replaced by vacuum compensator valve.

(Electronically controlled metering pumps are product of Process Equipment Division, Lapp Insulator Company, 116 Hall St., LeRoy, N.Y.)

Check 4392 opposite last page.

Dewpoint tells the tale in moisture monitoring

Uses: Automatic and continuous measurement, indication and recording of moisture content of gases.

Features: Dewpoint recorder automatically and continuously operates to reveal moisture content of gases.

Description: Recorder determines gas moisture content by measurement of dewpoint. Photoelectric null system is used to measure size of dew spot formed on metallic mirror by gas condensate. Readings thus given are independent of test-gas temp.

Dewpoint recorder can be utilized for variety of control functions. It is available with choice of standard-electric or pneumatic-control instruments and either round- or strip-chart recording.

(W-C dewpoint recorder is specified in Bul DPR-5 — Weighing & Controls Inc., 537 E. County Line Rd., Hatboro, Pa.)

Check 4393 opposite last page.



. . . her conscientious workmanship watches over

RECORDING CHART RELIABILITY

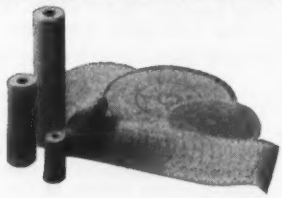
"Dish" occurs at the core end of a roll chart wound with incorrect tension. It means loose winding — and can lead to trouble.

Lois Deinhart, one of GC's experienced rewind operators, helps prevent this trouble from ever occurring. Here she is operating one of a battery of high speed precision rewind machines that roll strip charts to the exact length and tension required. Inspection by Lois and other skilled operators allows only perfect rolls to pass for shipment.

Because of special equipment and specially talented people, GC has become the world's largest manufacturer of recording charts—producing rolls, for instance, for virtually every make of strip chart recording instrument on the market. Over 70 different types of cores are available, each suited to the requirements of a specific instrument. End of roll indicators can be provided for visual, mechanical or electronic alarms.

GC's stock catalog lists over 15,000 different types of circular, strip and rectangular charts. We also design and produce special purpose charts to fit your most exacting needs.

More than 5,000 chart users have come to rely on GC Recording Charts for accurate, dependable performance—chart after chart—year after year. In fact, GC Charts must be good to sell so well for so long. Try them yourself ! Let us send you our complete 1960 Stock List, and sample charts for one of your instruments.

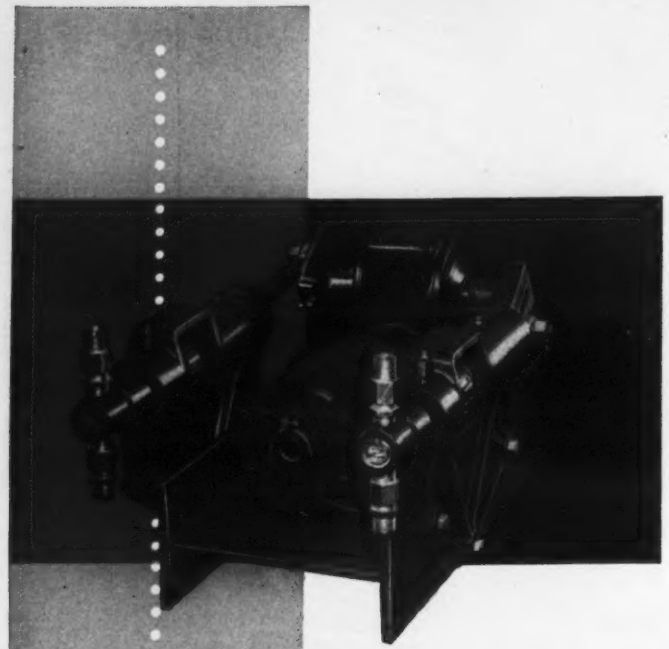


RECORDING CHARTS

Distributed by:
TECHNICAL SALES CORPORATION
189 Van Rensselaer St., Buffalo 10, N. Y.
A Subsidiary of
GRAPHIC CONTROLS CORPORATION

Check 4394 opposite last page.

POSITIVE CONTROL OF MATERIALS IN MOTION B·I·F METERS FEEDERS CONTROLS



ONE PUMP PROPORTIONS ALKALINE, NEUTRAL OR ACID CHEMICALS

B·I·F Proportioneers Adjust-O-Feeder

Gives Application Versatility At Low Initial Cost

Meet changing requirements without changing your entire pump! Low cost changeover, with plug-in reagent ends, makes Model 1140 Proportioneer® extremely versatile in the capacities and types of chemicals it can handle. Compare these performance characteristics with competitively priced pumps:

Accuracy within ±1% of set rate.
Adjustment range of 15:1 (not 10:1 as most).
Capacity from 0.8 gph to 850 gph.
Discharge pressures up to 1340 psig.

You'll find opportunities for cutting costs and improving efficiency in process feeding when you consult B-I-F — manufacturer of the most complete line of solid and liquid feeders.

B·I·F Industries

BUILDERS-PROVIDENCE • PROPORTIONEERS • OMEGA

METERS • FEEDERS • CONTROLS / CONTINUOUS PROCESS ENGINEERING

For complete details on Model 1140 request Bulletin 1140.20-1. Write **B-I-F Industries, Inc., 387 Harris Ave., Providence 1, R. I.**

Check 4395 opposite last page.

CHEMICAL PROCESSING Process & Laboratory INSTRUMENTATION 6th Annual Feature

Instrumentation Literature

Keep your files up to date by selecting from this list of the latest publications

Transistorized conductivity monitors can be applied to variety of solution electrolytic-conductivity measurements, including demineralization of water, condensate purity checks and similar applications. These units are presented in four-page Bul E-95(3)—Leeds & Northrup Company.

Check 4396 opposite last page.

Transistorized temperature controls employ interchangeable printed-circuit boards. Several models are available with variety of modifications. They are delineated in Bul MC-190—Monitor & Controls Division, Fenwal Incorporated.

Check 4397 opposite last page.

Computer for algebraic functions of a complex variable can be used in design of servomechanisms, synthesis of networks and other problems requiring solution of Laplace transforms of linear differential equations. Computer is specified in four-page Cat Sheet C-20—Electro-Measurements, Inc.

Check 4398 opposite last page.

Digital computer is presented in 12-page bulletin including schematic diagrams of various process and control functions of unit. Digital Computer 312 Bul—General Electric Company.

Check 4399 opposite last page.

Loading reactor is considered in single-page Data Sheet SE-L2606—The Superior Electric Company.

Check 4400 opposite last page.

Surface pyrometers for variety of purposes are available in roll, extension, mold and needle types. They are subject of 12-page bulletin including variety of application pictures. Bul 194-SR—Cambridge Instrument Company, Inc.

Check 4401 opposite last page.

Liquid-level gages and valves are topic of eight-page bulletin incorporating chart outlining types available, features and specifications of many models in line. Cat 376—Jerguson Gage & Valve Co.

Check 4402 opposite last page.

Corrosion-resistant solenoid valves have Teflon-molded bodies. They are expanded upon in Teflon Solenoid Valves Bul—Valcor Engineering Corporation.

Check 4403 opposite last page.

Thermowells, for thermocouples, bimetallic thermometers, filled systems and test equipment, are cataloged in six-page Bul 304—Trinity Equipment Corporation.

Check 4404 opposite last page.

Metering pumps are reviewed in 32-page bulletin which contains detailed drawings of various models in line. Also incorporated in publication are tables of construction materials, operating pressures, displacement for plunger diameters, and service recommendations. Chemical Feeders Bul—Manzel, Division of Houdaille Industries, Inc.

Check 4405 opposite last page.

Electrolytic-conductivity equipment is tabulated in 28-page bulletin incorporating discussions of solution-conductivity measurement, measuring circuits, conductivity cells and temperature compensation. Cat 23—Industrial Instruments Inc.

Check 4406 opposite last page.

Electronic interval timer with recovery time of less than 0.01 sec is featured on single-sheet Interval Timer L Bul—C. W. Logeman Company.

Check 4407 opposite last page.

Single solenoid valve is two-position, four-way type having ¼" orifices. It is delineated in single-sheet Bul 8344 Supplement—Automatic Switch Co.

Check 4408 opposite last page.

Hydrogen flame detector is supplement to standard thermal-conductivity detector used in manufacturer's gas chromatograph. Unit is detailed in six-page bulletin incorporating typical chromatograms and flow-control diagram. Bul 781—Scientific and Process Instruments Division, Beckman Instruments, Inc.

Check 4409 opposite last page.

Vapor fractometer incorporates established features of standard gas chromatography and also includes Golay (capillary) columns. This is among products reviewed in 34-page Vapor Fractometer 154-D Bul—The Perkin-Elmer Corporation.

Check 4410 opposite last page.

Turbidity instruments for monitoring color, turbidity and fine-dust loadings are treated in single-sheet Bul 531—Photomation Inc.

Check 4411 opposite last page.

Automatic sample changer is designed for completely unattended operation. Unit is pictured and diagrammed in four-page Sample Changer C-115 Bul—Nuclear-Chicago Corporation.

Check 4412 opposite last page.

Control timer, for substances such as synthetic adhesives, silica sols, drying oils and plastics, is featured on single-sheet Tecam Gelation Timer Bul—Arthur S. LaPine and Company.

Check 4413 opposite last page.

High-temperature thermocouples for service of 2000°F and up are discussed in 30-page Product Information Report 8.1—Aero Research Instrument Company, Inc.

Check 4414 opposite last page.

Digital-information-system operation is explained in eight-page bul E72-2—Bailey Meter Company.

Check 4415 opposite last page.

Control valve is featured on Data Sheet 101—Conoflow Corporation.

Check 4416 opposite last page.

Tested and calibrated laboratory apparatus from stock is topic of four-page Laboratory Apparatus Bul—Standards Division, United States Testing Company.

Check 4417 opposite last page.

Pneumatic instruments are subject of 12-page catalog. Pressure and temperature pilots and pneumatic transmitters are described and specified in Cat 515—United States Gauge, Division of American Machine and Metals, Inc.

Check 4418 opposite last page.

Indicating bellows meter combines characteristics of mercuryless bellows meter body with six-inch dial indicator. It is presented in four-page Specification S224-1—Industrial Division, Minneapolis-Honeywell Regulator Company.

Check 4419 opposite last page.



ABSOLUTE PRESSURE d/p CELL TRANSMITTER
with full-power 3-15 psi signal

Now there's a Foxboro d/p Cell designed specifically for low pressure measurement and transmission. It's the new Type 13AA Absolute Pressure Transmitter.

One side of the 13AA is evacuated, providing an absolute zero reference for the measurement of any process pressure. The 3-15 psi output signal has ample power for direct operation of standard receiver recorders and controllers.

This transmitter is simple in construction for trouble-free service. It provides for easy draining, steam tracing, and cleaning by regular maintenance procedures. Type 316 S.S. construction. Positive overrange protection to 1500 psi.

The 13AA Absolute Pressure Transmitter is ideal for use with such process equipment as low pressure fractionating columns, evaporators, and vacuum crystallizers. Ask your Foxboro Field Engineer for detailed information, or write for Bulletin 458-22A. The Foxboro Company, 819 Norfolk St., Foxboro, Mass.

Specifications:

Range Spans: Adjustable 100 to 450 and 400 to 1500 mm of mercury

Output: 3-15 psi or 0.2—1.0 kg/cm²

Accuracy: 0.5 percent of full scale span on most ranges

FOXBORO
REG. U.S. PAT. OFF.
process instrumentation

Check 4420 opposite last page.



"Pipe-Line" Homo-Mixer showing intake turbine.

G-W high speed, high sheer homogenizer-mixer.

G-W Eppenbach HOMO-MIXERS

For Batch and In-Line Continuous Mixing

For mixing chemicals, cosmetics, pharmaceuticals, protective coatings, dyestuffs and inks to produce emulsions of small particle size and long shelf life, G-W Eppenbach Homo-Mixer and Continuous Flow "Pipe-Line" Mixers are specified by leaders in the chemical and drug processing industries. Both high speed, high sheer homogenizer-mixers insure complete, "no vortex" mixing. Simple to operate, unvarying in accuracy, easy to clean and vibration-free—these precision mixers employ impact and critical hydraulic sheering for maximum contact with materials, thereby keeping mix time to a minimum, while assuring product uniformity.

For in-line processing, the Eppenbach "Pipe-Line" Mixer provides processing of emulsions, slurries, suspensions and related mixtures on a continuous flow basis.

This "one pass" operation enables further processing of materials which may be recirculated . . . or units may be connected in series. Write for the complete story on these and other quality units described in our fully illustrated catalog.



FREE
24-page
Fact Book 600

GIFFORD-WOOD CO. EPPENBACH DIVISION, Hudson, New York

Please send me Eppenbach Catalog 600

Name_____

Title_____

Company_____

Address_____

City_____ State_____ 2708

Check 4421 opposite last page.

INSTRUMENTS & LAB

Nuclear accessories and related instrumentation are cataloged in 26-page Cat B—Atomic Accessories Inc., Subsidiary of Baird-Atomic, Inc.

Check 4422 opposite last page.

Thermocouples and thermocouple assemblies of both base and noble metals are subject of six-page Bul TT-306—Trinity Equipment Corporation.

Check 4423 opposite last page.

Flow tube for metering petroleum, chemicals, gases, steam and other processing fluids is presented in four-page bulletin including drawings of variations available. Dall Flow Tube Bul—B-I-F Industries, Inc.

Check 4424 opposite last page.

Telemeters are subject of 62-page bulletin, incorporating information on principles of operation, various applications and different types available. Drawings and photographs supplement this data in Bul M1715—The Bristol Company.

Check 4425 opposite last page.

Nuclear laboratory instruments and related accessories are specified in 64-page cat, including information on products of nuclear research, education and clinical applications. General Cat F—Tracerlab.

Check 4426 opposite last page.

Digital computer is topic of 16-page bulletin which incorporates discussion of computer control on continuous and/or batch processes. Bul C-290—Industrial Division, Minneapolis Honeywell-Regulator Co.

Check 4427 opposite last page.

Meters, feeders and controls, including butterfly valves, flowmeters, and other types of process instrumentation are tabulated in Bul 0001.20-1—B-I-F Industries.

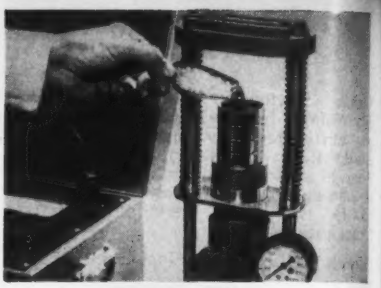
Check 4428 opposite last page.

Laboratory-instrument line, including monitors, recorders and polarographs, are pictured and described in 60-page Booklet 60—E. H. Sargent & Co.

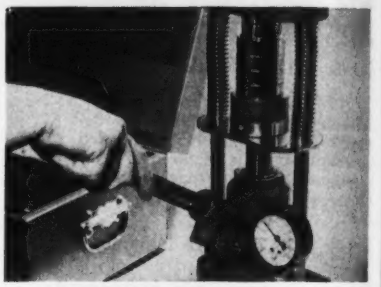
Check 4429 opposite last page.

Circuit-breaker-test units are tabulated in 16-page bulletin, including selector chart covering both molded-case and low-voltage-power circuit breakers. Bul SB-CB-1—Multi-Amp Division, Multi-Amp Electronic Corporation.

Check 4430 opposite last page.



FEED IT...



SQUEEZE IT...



READ IT...

G-5 Moisture Register for accurate moisture tests in 60 seconds

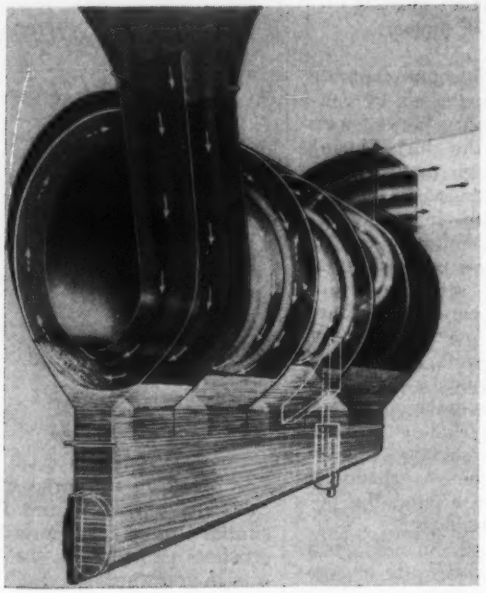
Fastest moisture test available with accuracy to 0%. Save production and lab time—no skilled labor needed. Use Electronic Moisture Register G-5 anywhere on granular, ground, loose, shredded and powdered materials. Hydraulic pressure assures homogeneous sample. Specially calibrated for ammonium nitrate, ammonium sulphate, toilet soaps, calcium carbonate, sulphur, ammonium perchlorate, sodium bicarbonate, polyethylene resins, many more. Accuracy guaranteed. *Ask for free trial.*

Write, stating material to be tested, and moisture range, or check No. 4431 on reader service card.

ELECTRONIC MOISTURE REGISTER Instruments

Moisture Register Co., Dept. CP
P.O. Box 910, Alhambra, Calif.

Check 4431 opposite last page.



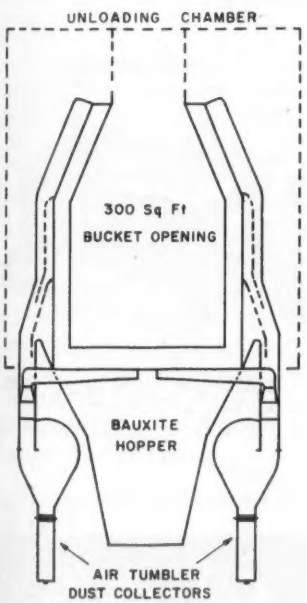
Drawing illustrates operating principle of dust collector. Dust particles are separated from air by centrifugal action. Water in lower portion of unit wets, entraps dust



Side view of giant tower used for removing bauxite from ships at Baton Rouge. One of the 35,000-cfm dust collectors is clearly visible below the paneled unloading chamber. Similar unit is installed on other side of tower

KING-SIZED DUST TRAP

Twin collectors in 125-ft-high dock-side bauxite-unloading tower handle 70,000 cfm



Dust collectors are located on opposite sides of hopper and immediately below the unloading chamber

Problem: Dust emanating from bauxite unloading operations presented a potential air pollution threat at the Baton Rouge, Louisiana, plant of Kaiser Aluminum & Chemical Corporation. Particles are reddish in color. The airborne agglomerates range in size from 45 to two microns. The ultimate particle size is in the submicron range.

The bauxite is a ferruginous aluminum hydroxide and arrives at the installation in an earthy state. Coming by ship from South America and the West Indies, it is transferred to shore by 125-ft-high unloading towers equipped with 10-ton-capacity clamshell buckets.

The tower travels along the dock in order to be positioned abreast of the several holds in the ship. The bucket is loaded, raised and brought inside the tower structure by being moved horizontally along a boom. Bucket's contents are then dumped into a 90-cu-yd-capacity hopper which feeds belt conveyors running into the plant. Majority of the dust is generated when the bucket is opened.

Solution: Two 35,000-cfm wet-type dust collectors were installed on each of two new unloading towers placed in operation during 1957. Collectors measure 22′6″ x 7′0″ x 17′10″ high. Units are located on opposite sides of hopper and immediately below the unloading chamber (see sketch).

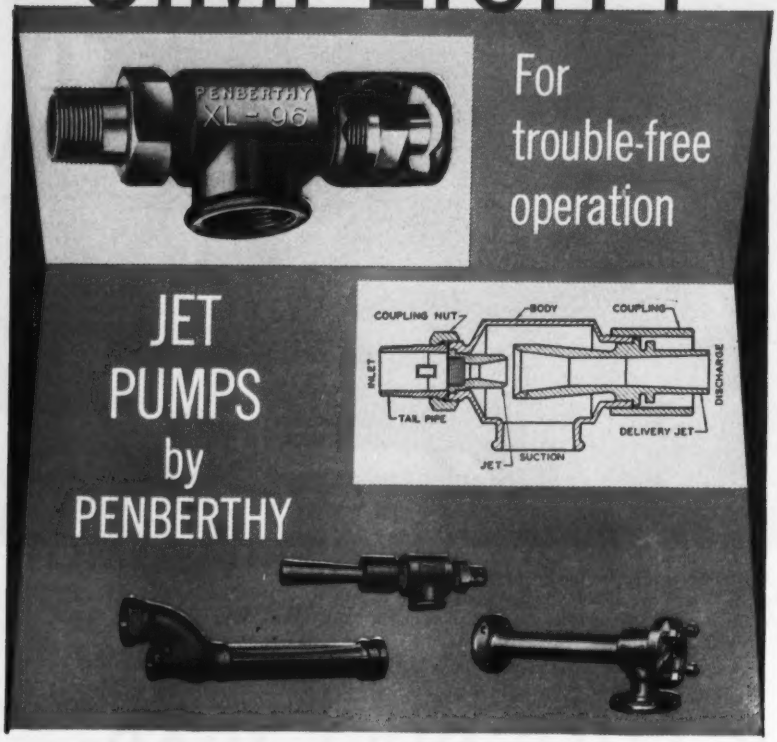
Each of the chambers is fully enclosed except for a 300-sq-ft opening in the side to permit passage of the clamshell bucket. In order to prevent dust from escaping through this opening, it was necessary to find some way of blocking it.

This was achieved by means of air supplied by a 66″-diam exhaust fan. Equipped with a 100-hp motor, unit maintains an air flow of 70,000 cfm at average velocity of 230 fpm into the bucket entrance.

Extreme care had to be taken to properly locate the exhaust ports for the air. If openings were positioned incorrectly—say, for example, at back of the unloading chamber — air would rush past the bauxite and create an additional dust problem.

Consequently, the air stream is withdrawn from around the inside periphery of the bucket entrance. Air turns as it passes through the opening and does not reach

SIMPLICITY



If you have a liquid heating, circulating, aerating, agitating, pumping or blending application (to mention a few), you'll find, chances are, that there just isn't a more economical, efficient, trouble-free device for handling the job than a Penberthy Jet Pump. They cost little to buy, little to install. And maintenance? Practically non-existent, for there are no moving parts, no packing glands, nothing to lubricate.

Penberthy, what's more, as the #1 name in Jet Pumps . . . with almost 70 years' experience in the field . . . offers you the broadest available selection of models, standard or special, steam, air or liquid operated, in a variety of materials. Ask a Penberthy engineer for assistance with your jet pump application.

PENBERTHY MANUFACTURING COMPANY
Division of Buffalo-Eclipse Corporation
PROPHETSTOWN, ILLINOIS
SALES OFFICE: 2660 E. GRAND BLVD., DETROIT 11, MICH.

PENBERTHY
Dedicated to Quality Since 1886

GENTLEMEN: Would like more information.
Please send your Jet Pump Catalog #512R.

NAME _____ TITLE _____
COMPANY _____
ADDRESS _____
CITY _____ ZONE _____ STATE _____

Check 4432 opposite last page.

the bauxite at all, thereby minimizing the dust load.

Water Doesn't Intermix With Air Stream

The dust collectors separate the dust from the air by centrifugal action. Water wets and entraps the dust. During its flow through the collector, dust is continuously centrifuged through four revolutions along a helical path.

Unit consists essentially of a stationary screw inside a horizontal, pear-shaped barrel. Lower portion of unit contains the water. Surface of water is swept by the air stream. The angular impingement and friction of air against the surface of the water induce a sheet of water to flow around the periphery of the barrel.

Air is at no point compelled to reverse or abruptly change its course, nor is its movement disturbed by baffles or other impediments. The water never crosses air stream.

Collected sludge is removed as slurry through two metered 2½" drains at bottom of unit. Sludge contains about 1.4% solids by weight. Rate of discharge is 250 gpm. It is sent to disposal site via 1'x450'-long trough.

Constant water level inside collector is maintained by adding slightly more water than is removed with sludge. Water is drawn from trough running along the whole length of the dock. It is delivered to the collectors by a 5-hp centrifugal pump on tower.

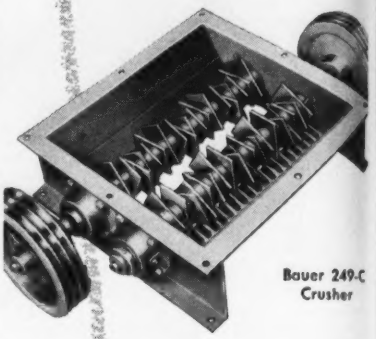
Results: The collectors satisfactorily handle the dust given off in the bauxite unloading operations. Units remove approximately 98 percent of airborne particles.

Machines have operated essentially maintenance-free since their initial installation. Similar equipment is functioning at Kaiser's Gramercy, Louisiana, aluminum plant.

(Further information about Air Tumbler dust collectors may be obtained from Dust Suppression & Engineering Company, 120 S. Broadway, P. O. Box 67, Lake Orion, Mich.)

Check 4433 opposite last page.

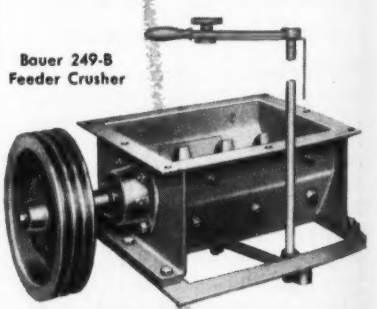
break the lumps *of compacted chemicals*


Bauer 249-C Crusher

For breaking up compacted chemicals, such as potash and charcoal, or similar industrial materials, Bauer crushers can provide the uniformity of size you want.

These units can be used independently or with Bauer attrition mills, hammer mills, breakers, granulators or fiberizers to speed the processing of virtually any type of material.

If you have a special problem in size reduction, the experience of our engineers and research staff is at your disposal with no obligation. Write for more details.


Bauer 249-B Feeder Crusher

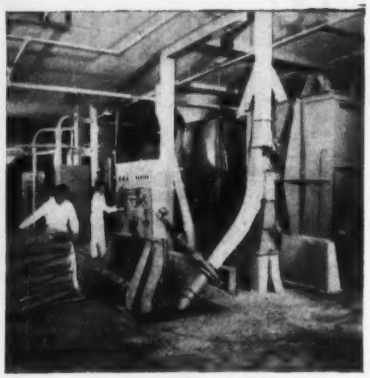
THE BAUER BROS. CO.
Springfield, Ohio

Bauer

Check 4434 opposite last page.

Problem:

To boost starch and gum production while cutting operating costs



Solution:

SPROUT-WALDRON

UNIT MACHINES AND SYSTEMS

When Morningstar Paisley executives decided to move activities to their new plant at Hawthorne, N. J., they demanded a system meeting these specifications: extreme versatility, no dust nuisance, protection against contamination, low handling and operating costs, stepped up capacity.

The answer was found in a packaged processing system involving Sprout-Waldron machinery for crushing, mixing, grinding and sifting; plus a series of four negative pressure pneumatic conveying systems.

Blending and bagging of starch, gum grinding and gum granulation are now being accomplished with a minimum of handling and maximum of efficiency. Operating costs are down, capacity up. For the full story ask for Bulletin F-19.

CW/107

SPROUT-WALDRON

Muncy, Pennsylvania

Size Reduction • Size Classification • Mixing
Bulk Materials Handling • Pelleting

Check 4435 opposite last page.

No water makeup needed with closed pump system on chiller

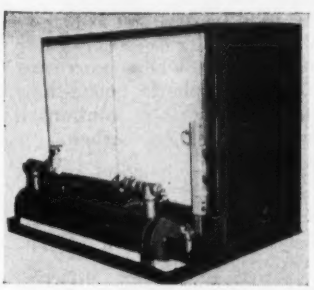
Minimizes accumulation of scale and dirt

Uses: Providing cooling water for injection molding, extruding or other related forming processes.

Features: Self-contained chilling system includes water pump and water storage tank. Unit is ready to function immediately upon connection to process.

Closed water pump system is capable of 100% water recovery and minimizes accumulation of scale and dirt.

Description: Compact, industrial water chiller includes compressor, condenser fan, fin-type condenser and chiller. Centrifugal pumps have dual voltage motor. Chilling component and pipe are insulated to prevent condensation.



Compact, self-contained water chilling system is ready for use, need only be connected to process

Floor- or Ceiling-mounted

Simplified design permits unit to be installed either on floor mountings or on ceiling. Side panels may be removed for inspection.

Multiple units can be installed to fill need for future increases in production. Thermostat protects unit from freezing. Large thermometer shows temperature at a glance.

(Multitem model TP water chillers are product of Application Engineering Corporation, 3811 Podling Drive, Franklin Park, Illinois.)

Check 4436 opposite last page.



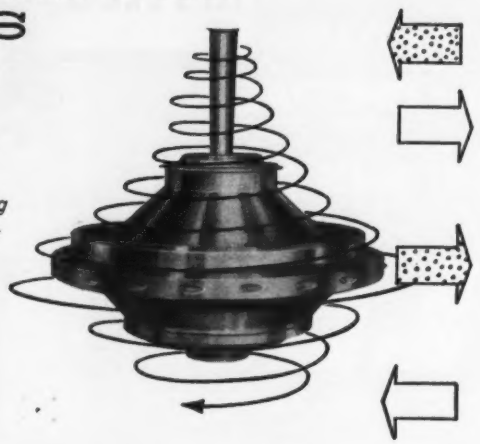
Check 4437 opposite last page.

Process Trends from DORR-OLIVER

A SERVICE TO THE PROCESSING INDUSTRIES

THE CENTRIFUGE TAKES OVER

A long-neglected equipment item is developing into a giant that is starting new trends in processing operations



Although the centrifuge has been with us for a long time, its full potentialities are only now being realized in the processing field. Partly, this is due to the increasing demand for faster, more precise methods of separation and classification, adaptable to continuous, automatic operation. More particularly, it is due to radical new developments in the centrifuge itself.

Centrifuges have now become so versatile in operation and have advanced so much in size, power and capability that opportunities for profitable application are virtually unlimited. They are replacing filters, settling tanks, screening and other separation and classification equipment. In many cases, they are cutting days off processing time. Important, too, since the centrifuge substitutes horsepower for size, is the greatly reduced floor space requirements and the smaller amount of critical material needed when handling highly corrosive solutions.

Dorr-Oliver has taken a leading part in the development of these newer, more versatile and more powerful units. An example is the high speed, high pressure Merco® centrifuge for operation at elevated temperatures. A successful application is in separating the catalyst from the polymer in the production of the new high density polyethylene.

Features of Dorr-Oliver design are the overhead bearing and drive which remove some of the limitations of conventional units and the revolutionary return flow principle that permits concentrating, washing, clarifying, classifying and recovery of soluble values at pressures up to 150 psi. Probably the largest centrifuge now in operation is a Merco unit. Rotor speeds up to 3300 rpm and capacities up to 600 gpm are possible. Smaller size, specialized units, among them the Mercone® Screening Centrifuge, are finding application in the food and pharmaceutical industries.

To those interested in the possibilities of centrifugation, Dorr-Oliver offers a wealth of information. For investigation and evaluation, pilot plant models are offered on a sale or rental basis. Just drop a line to Dorr-Oliver Incorporated, Stamford, Connecticut.

Dorr-Oliver offers a wide range of equipment, methods and complete systems for the processing industries. Operations include:

ROASTING • DRYING • CALCINATION • CLASSIFICATION • THICKENING • SCREENING • FILTRATION • CLARIFICATION • WASHING • AGITATION • CENTRIFUGATION • ION EXCHANGE • PUMPING

Check 4438 opposite last page.

More H_2S separated from plant atmospheres by improved carbon

Efficient removal of hydrogen sulfide from air is being reported through use of improved impregnated activated carbon in canister-type purification equipment. Material offers retentivity of 30% for H_2S.



Canister-type purifier contains ¾"-thick layer of carbon. Unit has 30% retentivity for H_2S

The units are currently being used in paper mills, rayon plants, refineries and similar installations where corrosive H_2S atmospheric conditions exist. The canister contains a ¾"-thick bed of carbon.

(Further information about Dorex type-H purification apparatus may be obtained from Connor Engineering Corp., Danbury, Conn.)

Check 4439 opposite last page.

Silicone treatment extends service life of glass filter bags

Reduces filament wear, ups heat resistance

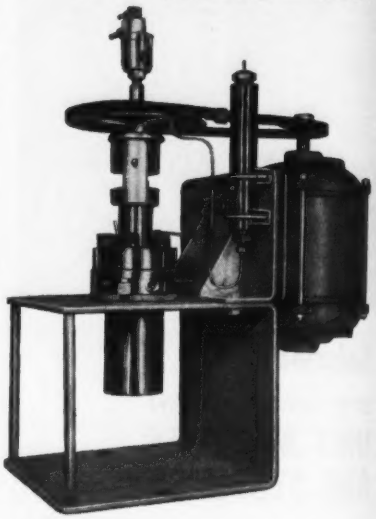
Twenty five times longer wear is possible with glass cloth filter bags treated with silicone. Manufacturers of the bags say that silicone treatment provides this bonus performance because it protects the woven glass fiber elements from the harsh effects of highly acid or alkaline gases, dust deposits, moisture and mechanical action.

In many cases, service life has been extended from an average of six weeks to as much as three years.

Silicone treatment also makes it easier to clean the bags. The silicone has a lubricating effect which reduces filament breakage and helps resist

for Bench Scale Research

300 ml.
5,000 p.s.i.g.
REACTOR



Features:

- New spiral grooved jacket for rapid heating and cooling available.
- Can be used with or without electric heating mantle.
- Standard electric heating also supplied.
- Simple flat bolted closure—fully confined spiral wound gasket.
- Shaft water cooled and guaranteed for 500 hours operation.
- Special intensifying lubrication cylinder—can be used with oil or water.
- Shaft speeds to 1,500 r.p.m.
- Removal of cover does not affect connections—up to six openings including ½" diameter rupture assembly through body flange are possible.
- Floor, wall or bench mounting.
- Body securely held to stand by two readily accessible bolts.

Write for Catalog Sheet #9-V.

PRESSURE PRODUCTS INDUSTRIES, INC.
Hatboro, Pa. OSborne 5-1600
Manufacturers of laboratory and pilot plant pressure equipment

Check 4440 opposite last page.

abrasive wear. Bag-type dust collectors using silicone-treated bags can operate continuously at temperatures up to 600°F.

(Further information about silicones may be obtained from Dow Corning Corporation, Midland, Mich.)

Check 4441 opposite last page.

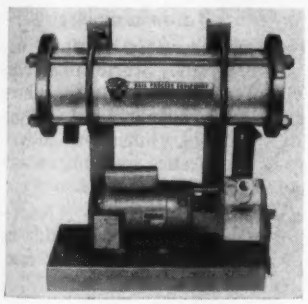
Graphite heat exchanger comes complete with pump

Flow capacity ranges from 5 to 15 gpm

Uses: Heating or cooling acids or other liquids in tanks with capacities up to 900 gal.

Features: Impervious graphite heat exchanger comes complete with recirculating pump.

Description: Combination package heat exchanger and pumping unit measures only 28" long by 10" wide and 20" high. Heat exchangers are of solid impervious graphite block construction minimizing danger of breakage and assuring long service life.



Combination package heat exchanger and pumping unit measures only 28" long by 10" wide and 20" high

Flow capacity ranges from 5 to 15 gpm. Units of this type are reported to be giving excellent service with nickel plating solutions where low filter flow rates are used.

(Combination package heat exchanger and pumping unit is product of Heil Process Equipment Corporation, 12850 Elmwood Avenue, Cleveland 11, Ohio.)

Check 4442 opposite last page.

for heating, cooling, combining, homogenizing, storing and pumping of fine chemicals, cosmetics, pharmaceuticals, biologicals

PROFIT ENGINEERED PROCESSING EQUIPMENT FROM CHERRY-BURRELL



A—THERMUTATOR HEAT EXCHANGERS. Heats to 350° F., cools to minus 50° F. Available with one, two or three tubes. Combinations of heating and cooling tubes for specific applications. All product contact surfaces stainless steel. Choice of heating or cooling mediums. Heat with steam or hot water — cool with water, freon, brine, ammonia, dowtherm. Write for Bulletin G-572.

B—HOMOGENIZERS. New, all stainless steel models. Single- and two-stage homogenizing valves. Plugs and seats of non-corrosive solid Stellite. Perforated, replaceable valve caps take 98% of valve wear. High-speed shearing action, steady pumping pressure assure complete particle dispersion, prevent globule separation back to pre-homogenized state. Available in 11 models. Capacities from 50 to 6000 gallons per hour.

C—"FLEXFLO" SANITARY CENTRIFUGAL PUMPS. Type 316 stainless steel. Four models with ¼ through 30 h.p., capacities from 2000 to 210,000 pounds per hour. Entire product end of pump quickly and easily taken apart for cleaning without tools. New hinged clamp ring for protection against distortion through abusive use — assures continued perfect alignment. New design shaft for "O"-ring impeller locking. New balanced rotary seal. Involute design. "Flexflo" design allows setting the outlet in any position. "Flexflo" centrifugal pumps also available in industrial unpolished models. Write for Bulletin G-567.

D—FITTINGS, VALVES AND STAINLESS STEEL TUBING. A complete line of fittings and valves for cleaned-in-place or take-down lines. All stainless steel. Flexlok tygon hose connections for connecting tygon hose to sanitary fittings. Stainless steel tubing in 1" through 4" sizes. Polished to 180 grit. Write for Bulletin G-559.

E—LAB MODEL PROCESSING VATS. 45-gallon capacity. Sidewall heating and cooling surface for wide range of temperatures. Four variable-speed agitators. Vat may be operated at atmospheric pressures or sealed for vacuum or pressure operations. Designed for laboratory product testing to determine process techniques and production machine design. Write for Bulletin G-545.

F—THERMINJECTOR. A new, flexible, completely automatic system for heating and cooking of pumpable products and mixtures. Reduces cooking time to minutes. Enables you to pump product — and cook it — on a continuous, steady rate to the Therminjector's maximum capacity of 3,000 lbs. per hour. Closed circuit operation eliminates possibility of contamination or incorporation of foreign materials. Write for Bulletin G-583.

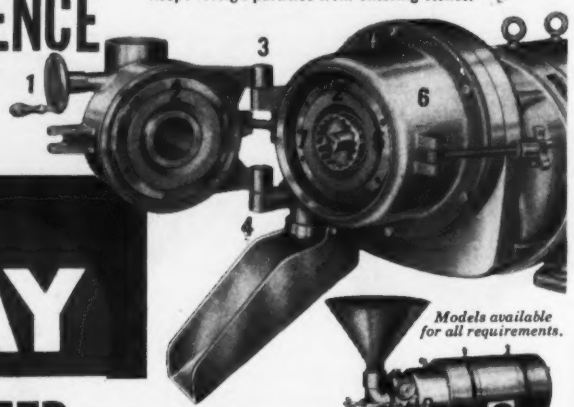
Address your inquiries to:

CHERRY-BURRELL CORPORATION
CEDAR RAPIDS, IOWA

Check 4443 opposite last page.

DESIGN SIMPLICITY MAKES THE DIFFERENCE AND THE PREFERENCE FOR DAY HY-R-SPEED MILLS AND FOR DAY PONY MIXERS... 3 ROLL MILLS... DOUBLE ARM MIXERS...

1 Micrometer adjustments are made on the stationary stone up to .0001".
2 Grinding stones of simple flat design are completely interchangeable. Replacement is quick and easy.
3 Cleans in a flash! Head opens on its own hinges to provide quick access to grinding chamber.
4 Horizontal models adaptable to varied mountings, and give complete control of discharge height.
5 Rotating stone and impeller direct-connected to motor shaft by short, rugged spindle.
6 Rust-proof aluminum head casting gives fast heat dissipation. Stainless steel models are available.
7 Basket impeller gives superior dispersing action; keeps foreign particles from entering stones.



Models available for all requirements.

With practically no maintenance required, except for stone replacement, it's little wonder that the Day Hy-R-Speed Dispersion Mill is preferred throughout the industry.

The J. H. DAY Co.
Division of The Cleveland Automatic Machine Co.
4952 BEECH STREET CINCINNATI 12, OHIO



Quality Mixing, Blending Milling and Sifting Machines since 1887

Check 4444 opposite last page.

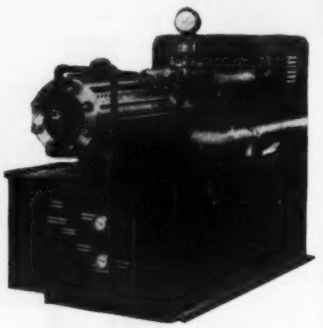
Combination reactor has three stages, is continuous

Uses: Performing polymerizations, esterifications, sulfonations and other reactions.

Features: Combination reactor provides high liquid shear in mixing phase, predetermined flow path without short circuiting in reaction phase, and effective condensation-deaeration using centrifugal-vacuum core principle in third phase.

Description: Continuous three-stage reactors are designed for either laboratory or commercial applications. Machine consists of three compartments: mixing, reactor and condensation-deaeration.

Each stage is equipped with impellers for continuous agitation. High heat transfer efficiency is obtained by continual wiping of thin film. Impellers for the three stages are driven by single shaft. Number of chambers in each stage can be varied to meet specific process requirements.



Combination reactor mixes, reacts, and provides condensation-deaeration

(Further information about continuous three-stage reactor may be obtained from Marco Development Company, Wilmington, Delaware.)

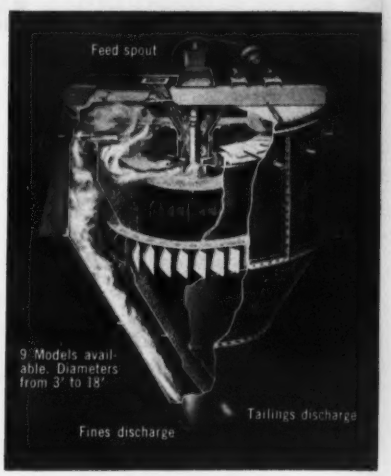
Check 4445 opposite last page.

Gas dryer that needs no heaters for reactivating desiccant beds is depicted in six-page bulletin. Unit provides dewpoints below −100°F for compressed gas or air. Operating principles and specifications are reviewed. Bul HA-308 — Trinity Equipment Corporation.

Check 4446 opposite last page.

Size Requirements Getting Tougher?

Sturtevant Air Separators Increase 40 to 400 Mesh Output as Much as 300%



Closed-circuit air separation is of proved advantage in reduction processes. Result is a better, more uniform product. Grinding mills perform at top efficiency, output frequently increases as much as 300%, power costs drop as much as 50%.

Precise separation of all dry powdered materials. Sturtevants currently classify sulfur, soybeans, phosphate, chocolate, feldspar, sand and aggregates, pigments, limestone fillers, flour, abrasives, plastics, gypsum, ceramics, cement and other products.

Improve screening — Sturtevant Air Separators prevent blinding by removing undesirable tailings *or* fines from screen feed loads.

Works Like Winnowing Done in a Whirlwind

Sturtevant Air Separators do a mechanical job of winnowing. Precise control of whirlwind air currents and centrifugal force results in the desired size being lifted into fines cone, oversize falling into tailings cone.

A 16 ft. Sturtevant, for example, has taken a feed rate of 800 tph, containing only a *small* percentage of desired fines, and delivered 30 tph 90% 200 mesh, recirculating the oversize through the grinding circuit.

Send for Bulletin No. 087.

STURTEVANT
MILL COMPANY
119 Clayton St., Boston, Mass.
Crushers • Grinders • Micron-Grinders • Separators
Blenders • Granulators • Conveyors • Elevators

Check 4447 opposite last page.

THAT'S INTERESTING

Compacting computers

Researchers at Stanford Research Institute visualize the computer of the future as having complexity and compactness of human neural networks while being able to operate with electronic speed. They would be able to "learn," sufficiently portable to be taken to problems; inexpensive, reliable and self-repairing. To attain this goal they are developing techniques for using electron beams as tools for micromachining. Such techniques would permit fabrication of components and interconnections in a plane with a density of 100 million per square inch.

Waste used for power

A Norwegian pulp and paper manufacturer is building the world's first large-scale commercial plant for production of power by utilizing organic waste as fuel. The $3 million plant of Aktieselskapet Borregard will use Sterling Drug's Zimmerman process.



DATA FOR COST ESTIMATION

Falls Industries provides this 32-page report to keep busy processing people up-to-date on the latest designs and costs of impervious graphite processing equipment. Sixteen different types of equipment are covered from Hydrochloric Acid Absorbers and Cross-Bore Heat Exchangers to Rupture Disks and Thermowells. Information supplied includes standard sizes, dimensions and costs.

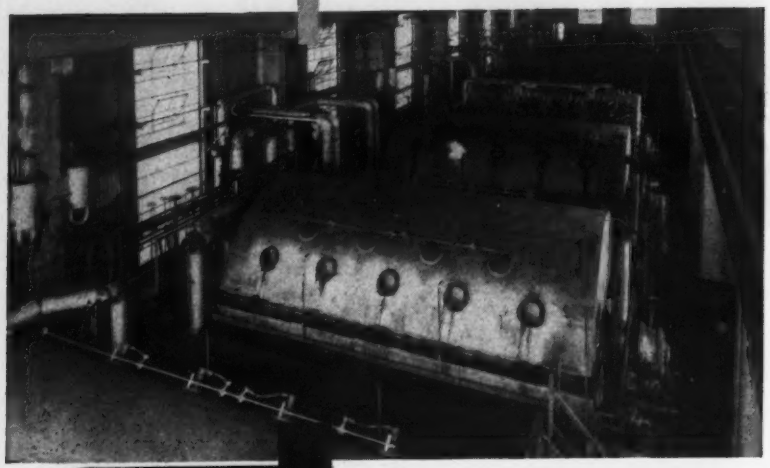
Because Falls Industries is so active in developing new and improved impervious graphite processing equipment, this cost and standards report is periodically revised. This present report is the third revision since this service was inaugurated. It is available on request to Engineering Department . . .

FALLS FI INDUSTRIES, Inc.

Solon, Ohio • Phone: CHurchill 8-4343 • TWX: Solon 0-720

Check 4448 opposite last page.

the problem: low oil content quality wax on a HIGH PRODUCTION BASIS



ROTARY DRUM FILTERS HANDLE THE JOB... EFFICIENTLY!



High efficiency is obtained with this G-B filter system for Mobil Oil Company at its Beaumont, Texas Refinery. These units feature a self-contained variable speed drive, efficient modern lighting and sight glasses, 2" and 3" FOAMGLAS insulation for low temperature operation. Fine quality parrafin wax of low oil content is obtained on a high production basis.

G-B filters are customed designed to meet your specific need. Write for more detailed information.

See our insert in Refinery Catalog and CEC.



GOSLIN-BIRMINGHAM
MANUFACTURING CO., INC.
P. O. BOX 631 BIRMINGHAM, ALABAMA
FILTERS • EVAPORATORS • PROCESS EQUIPMENT • CONTRACT MANUFACTURING including HEAVY CASTINGS

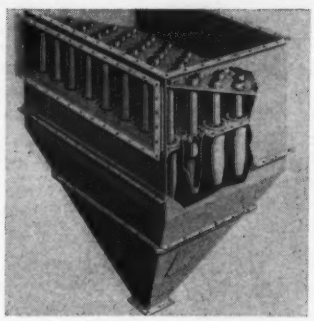
Check 4449 opposite last page.

Collector is compact, flexible and easy to install

Has good efficiency handling wide range of dusts

Uses: Dust control in chemical and allied industries. Unit is capable of handling variety of materials, including abrasive and fibrous products in wide temperature range.

Features: Compact unit is designed for maximum flexibility. Collector can be adapted to fit virtually any available plant space.



Dust collector's tubes and inlet vanes assure uniform gas flow to each cyclone

Description: Cyclone collector has cast 9" diam tubes and vanes and is of all-steel construction. Special materials are available to fit individual requirements. Design provides for easy accessibility and inspection of components.

Tubes and inlet vanes assure uniform gas flow to each cyclone and provide optimum centrifugal force to remove even lower range particle sizes. Typical collection efficiencies at 4" draft loss are as follows: fine fly ash — 84%, cement — 88%, coarse fly ash — 93% and stoker ash — 97%.

Units are capable of collecting anywhere from a few thousand to several hundred thousand cfm.

(Cyclone collectors are product of Air Pollution Control Division, John Wood Company, Bernardsville, N. J.)

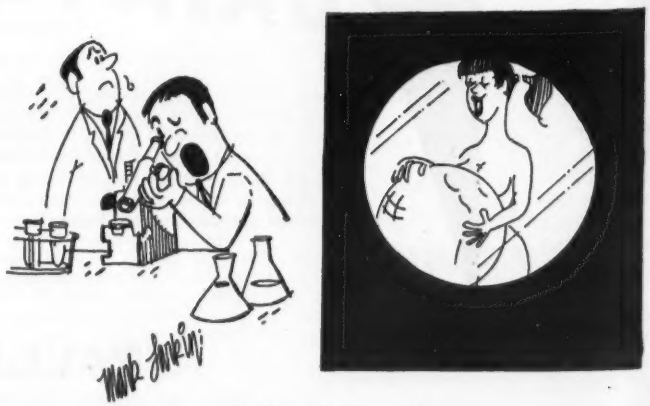
Check 4450 opposite last page.

New plant turns out big Al plate-and-fin heat exchangers

Dip-brazed units slated for cryogenics field

Aluminum heat exchangers having up to 22,000 sq ft of heat transfer surface can be dip-brazed at Stewart-Warner's new Indianapoils, Indiana plant. Reported to be largest facility of its kind in the U. S., the plant's first shipment consisted of a group of 8000 sq ft units.

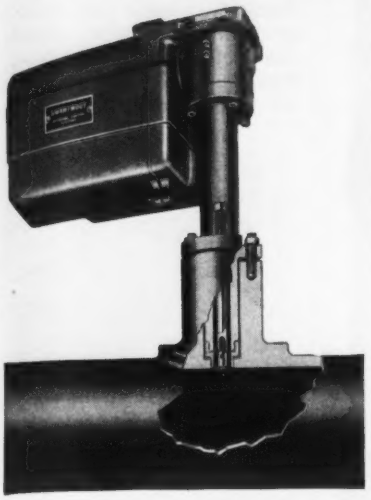
Major market will be field of cryogenics. In low temperature applications, close control of approach temperatures



"I thought so . . ."
Mark Larkin, Electra Mfg. Co.

Great things are happening in AutroniC® Control

TOUGH PROBLEMS ARE NO PROBLEM



FOR THIS FOOLPROOF, FOUL-PROOF PRESSURE TRANSMITTER

Here is a primary sensing element for those tough jobs you'd like to forget. Mounted right on the process pipeline or tank, the Swartwout Flush Diaphragm Pressure Transmitter will effortlessly measure pressure or liquid level of polymers, slurries, asphalts, viscous fluids, molten metals and other difficult media. No stagnant pressure lines, no steam jacketing necessary . . . the stainless steel transmitter diaphragm fits flush with the inside of the vessel.

A friction-free linkage multiplies diaphragm motion and actuates the core of a differential transformer to produce a 0-0.5V AC signal for any Swartwout AutroniC indicator, recorder or controller. Sensitivity is better than 0.005%, reproducibility 0.1%, accuracy 1.0%.

The Flush Diaphragm Pressure Transmitter is just one unit in the constantly-growing AutroniC family of electronic instrumentation . . . a family that includes all necessary components for complete electronic control of any process parameter.

For details on the Flush Diaphragm Pressure Transmitter, request Bulletins A-713 and A-718. Swartwout Division, Crane Co., Hooksett Industrial Park, Manchester, N.H.

SWARTWOUT

. . . world leader in electronic process instrumentation

S.A. 1958

Check 4451 opposite last page.

which can be achieved with aluminum plate-and-fin type units reduces refrigeration costs and permits more efficient and economical plant operation.

Another big factor is low initial cost. In applications where 3000 sq ft or more of heat exchange surface are required, cost of aluminum units, per sq ft of surface, is considerably less than that of mild steel shell-and-tube units. Aluminum units are even more favorable when compared to prices of stainless steel, brass or aluminum shell-and-tube exchangers.

(Further information about brazed aluminum plate-and-fin heat exchangers can be obtained from South Wind Division, Stewart-Warner Corporation, 1826 Diversey Pkwy., Chicago 14, Ill.)

Check 4452 opposite last page.

Blender operation simplified by automatic program control board

Permits valuable savings in operator time

Uses: Fast, accurate blending of powders, pastes and liquids.

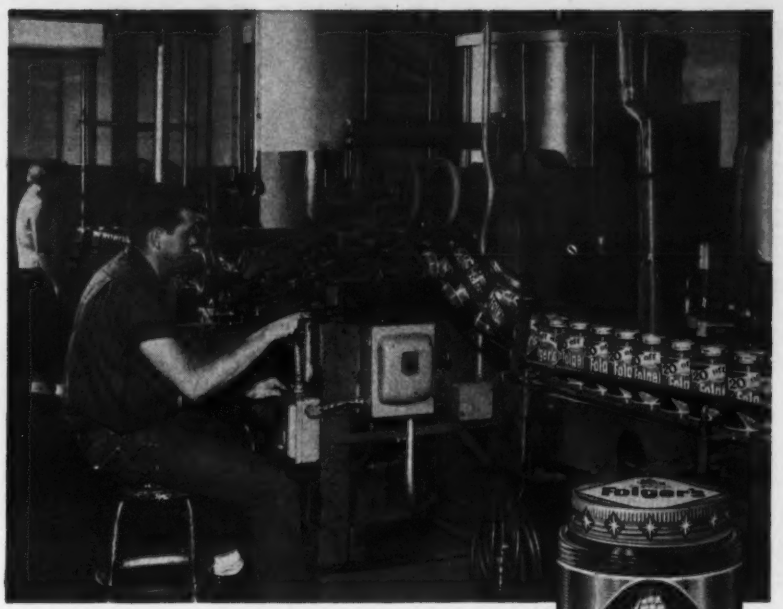
Features: Blenders have automated control and are pre-engineered to help reduce initial cost.

Description: Blender's automatic program control board permits all auxiliary equipment for mixing cycle to be set into operation individually or in sequence. Valuable operator time can be saved with this arrangement.

Good blending is obtained without stratification by efficient mixing action. Design combines self-reversing flow with top-to-bottom turnover. Blenders are available in wide range of sizes and can be equipped with choice of four different agitators.

(Further information about ribbon blenders may be obtained from Tower Iron Works, 60 Bordon Street, Providence, Rhode Island.)

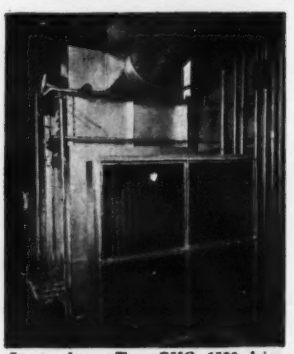
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Dry air speeds packaging ...protects quality of instant coffee

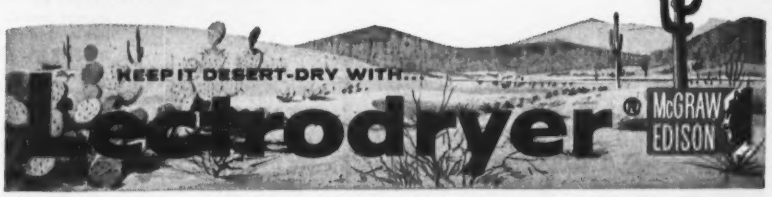
Instant coffee absorbs moisture fast. If this happens before it reaches the coffee cup—say when it's being packed—it can clog up packaging machines, ruin the quality of the coffee. In Houston, where humidity stays high for long stretches, the makers of Folger's coffee solved the problem by installing a Lectrodryer that keeps relative humidity at 25% to 35%.

Controlled dryness by Lectrodryer has been the answer to many problems caused by moisture; gumming up of hygroscopic powders, corrosion of metal, air line freezeups, and contamination of drugs, chemicals, liquids, gases.



Lectrodryer Type CHO-1500 dries recirculated and make-up air at the Folger plant.

For a Guide in Planning your own drying system, write for Lectrodryer's Case History Sheets, which give details on how many of these problems were solved. Tell us where you're having trouble with moisture. Pittsburgh Lectrodryer Division, McGraw-Edison Company, 352 32nd Street, Pittsburgh 30, Pennsylvania.



Check 4454 opposite last page.

SERIES 40 GOBBLES UP EXTRA HEAVY CONDENSATE LOADS

This "thirsty" Yarway Impulse Steam Trap gives you all the well-known Yarway advantages like *quick heat-up, even temperatures, small size, good for all pressures, non-freezing*—PLUS the added feature of *huge capacity.*

For example, at 100 psig the ¾" size will handle 5600 lbs/hr; the 2½" size, 62,000 lbs/hr.

Specify the Yarway Series 40 Trap for applications on large autoclaves, cooking kettles, heat exchangers, heating coils and other places where loads are heavy.

Buy the Yarway Series 40 from your nearby Industrial Distributor—more than 270 stock and sell the Yarway line. Over 1,250,000 Yarway Impulse Steam Traps already sold.

YARNALL-WARING COMPANY
100 Mermaid Ave., Philadelphia 18, Pa.





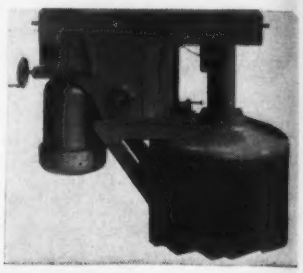
SERIES 60—normal needs, pressures to 400 psi, 6 sizes. **SERIES 120**—normal needs, pressures to 600 psi, 6 sizes. **SERIES 40**—for extra heavy loads, 5 sizes. **NO. 30**—for extra light loads (½" only). **INTEGRAL STRAINER**—highest pressures and marine use, 6 sizes.

YARWAY | *impulse® steam traps*

Check 4286 opposite last page.

High-shear mixer designed for use on closed tanks

Manufacturer of high-speed dissolvers has announced availability of a unit especially designed for use on closed-head tanks. Device is suitable for either vacuum or pressure



High-speed dissolver is especially designed for mounting on sealed tanks

service. Applications include general mixing, dissolving, emulsifying and deagglomerating. Viscosities up to 50,000 centipoises can be handled.

Variable-speed drive mechanism is said to be capable of delivering 90% of motor horsepower to the high-shear impeller—even at low speeds, regardless of changes in material or viscosity. Speeds may be changed without shutting down the unit. Equipment is available in sizes ranging up to 40 horsepower.

(Cowles dissolvers are product of Morehouse-Cowles, Inc., 1150 San Fernando Rd., Los Angeles 65, Calif.)

Check 4460 opposite last page.

Graphite heat exchangers resist two corrosive streams at FMC

In 1958, Food Machinery and Chemical Corporation, Mineral Products Division, installed four graphite heat exchangers in a di-chloro cyanuric acid plant at South Charleston, West Virginia. Two of the heat exchangers were used for heat exchange between two corrosive process streams comprising essentially dilute sulfuric acid plus chlorinated organics. The units

have 200 sq ft and 100 sq ft of surface area, respectively.

Graphite block design heat exchanger is essentially corrosion resistant on both process and service sides. In order to handle two corrosive streams, it is only necessary to provide corrosion-resistant heads on surface side as well as process side. This can be done on a nominal price increment.

The larger unit at FMC is cooling process liquor from 105-60°F, using cold process liquor at 41°F, leaving the exchanger at 94°F. The other exchanger is cooling process liquor from 222-144°F, and using cold process liquor at 94°F, leaving at 175°F.

As noted from foregoing temperature figures, in both cases the graphite heat exchangers are handling a substantial single 'temperature cross' in that cool streams are leaving an exit temperatures considerably higher than the exit temperature of the commonly hot streams. In a conventional heat exchanger, it would be necessary to use at least two separate heat exchangers with parallel flow of the service streams in order to pass through the temperature cross. This graphite block-type exchanger, with its approach to true countercurrent parallel flow, permits the temperature cross to be achieved with one heat exchanger unit.

All of the exchangers have given good service at FMC.

(Graphite heat exchangers are product of Delanium Graphite Div., Kearney Industries, P.O. Box 501, South Plainfield, N. J.)

Check 4287 opposite last page.

Optimization of chemical processing operations for the manufacture of resins and other products is discussed in 50-page booklet. The optimization service provided by company is similar to process dynamics.

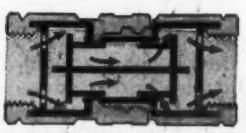
Company is able to take an inefficient or only moderately efficient plant and streamline it. Information and equipment are available for converting research data into a continuous process. "Continuous Processing Equipment"—Marco Development Co., Inc.

Check 4288 opposite last page.

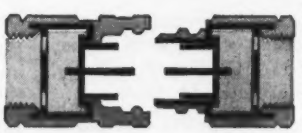


There's a size and type to handle almost anything that flows

TO USE SNAP-TITE VALVED COUPLING:



CONNECT—Full flow instantly



DISCONNECT—No flow instantly

Snap-Tite can provide the right size valved coupling for most any use . . . with quick off-on action wherever coupling or shut-off is required.

"H" series valved couplings for high pressure applications. High resistance to heavy line surge. Sizes from ⅛" through 6". Larger sizes on special order.

"IH" series valved couplings for greater impact in air lines. ⅛" through ½".

"E" series valved couplings for vacuum and very low pressure. Recommended for gravity flow. Sizes from ⅛" to 6". Larger sizes on special order.

"T" series valved couplings for hard to handle fluids. The only valved quick-disconnect couplings now on the market for fluid temperatures from −40°F to +400°F. Sizes from ½" through 3".

Snap-Tite valved couplings are available with two-way or one-way automatic line shut-off. They are normally furnished in alloy steel. Also available in brass, aluminum, or stainless steel with a variety of finishes.

Write for Snap-Tite Catalog No. 58 for more information on Snap-Tite valved couplings.

Snap-tite
UNION CITY, PA.

87-59-02

Check 4289 opposite last page.

FOR ALL INDUSTRY
WHEREVER THERE'S A
DRYING PROCESS

DRYERS
by SARGENT

Does your product need short or long exposure drying? Is production measured in ounces or tons? Should it be batch or continuous process drying?
Whatever your needs, there's a SARGENT to do the job. SARGENT Dryers are working in widely varied industries — chemicals, rubber, food, tobacco, textiles — wherever there's a drying process. They are pre-dominant, industry-wide, in profitable operation. Each dryer has these "plus" advantages, standard in every SARGENT machine:

- Exclusive, pre-assembly method means record-breaking speed of installation at your plant.
- Heat source can be gas, oil, steam, electricity.
- Economical — use as little as 1.2 lbs. steam per pound of water removed.
- Drying uniformity; trouble-free operation.
- Rugged construction; takes the gaff of heavy volume production.
- Complete, hold-to-the-line, temperature and humidity controls.
- Dependable, high-level production at unprecedented economy.



Courtesy, American Industrial Clays, Inc., Sandersville, Ga.

SARGENT 2-Stage, Kaolin Dryer With Extruder

To meet required hourly production in design of this dryer, local conditions suggested the economy of using both gas and oil for the heat source. Combination type burners using both fuels on the same equipment, were therefore incorporated in its design for installation on top of the dryer housing with platforms for inspection and maintenance.

This SARGENT 22-section, 2-stage dryer delivers large tonnage hourly of filler or coating clays. Entering moisture is usually 35% wet basis; and leaves the dryer at 2% or less moisture content, as required. The unique SARGENT double hopper extruder feeds the dryer with a very even porous bed of clay on the dryer conveyor. Simple adjustments easily adapt this machine to various densities of clay.

Another example of SARGENT modern design and advanced engineering in building dryers to meet varying requirements.

C. G. SARGENT'S SONS CORPORATION
Graniteville, SINCE 1852 Massachusetts

PHILADELPHIA • CINCINNATI • ATLANTA • CHARLOTTE • HOUSTON • CHICAGO • DETROIT • TORONTO

Check 4456 opposite last page.

PROCESSING EQUIPMENT

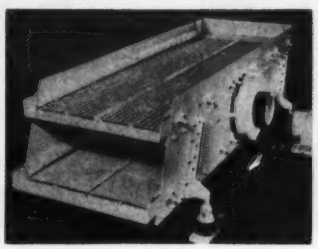
Vibrating screen designed for rugged service, low cost

Can be either floor-mounted or suspended from ceiling

Uses: Dry or wet screening of such materials as limestone, ore, etc. Unit may also be used for dewatering operations.

Features: Four universal brackets mounted on side of frame permit attachment of either supporting feet with spring mounts or overhead cables for suspension mounting. Pitch angle of screening surface can also be adjusted by brackets.

Description: Vibrating screens are designed to fill need for low cost, rugged, durable screening equipment.



Brackets mounted on side of vibrating screen's frame permit attachment of supporting feet or overhead cables for suspension mounting

Units are supplied without supporting base. Modular design permits several different sizes to be assembled from standard components.

Screen is vibrated by an off-balance shaft supported in two bearings. Device imparts high speed and circle-throw motion to screening surface. Machines are available in sizes ranging from 3 x 6′ to 6 x 16′ in one, two, or three decks.

(Ty-Rocket vibrating screens are product of the W. S. Tyler Company, 3615 Superior Avenue, Cleveland 14, Ohio.)

Check 4457 opposite last page.

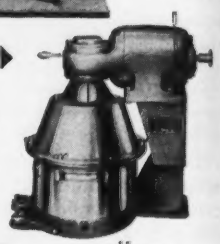
Permanent magnetic pulleys are summarized in six-page folder. Selection chart tells how to specify correct pulley for any given system. Bul 1022 — Stearns Magnetic Products.

Check 4458 opposite last page.

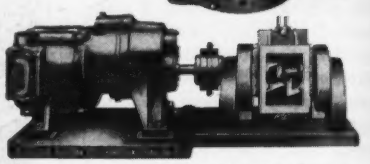
RESEARCH & DEVELOPMENT
REQUIRES THE BEST MIXING, GRINDING & DISPERSING EQUIPMENT



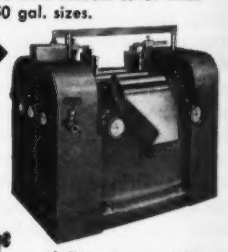
#130EL—2 gal. variable speed Double Planetary Change Can Mixer—1 qt. — 150 gal. sizes.



#130EL — 1 gal. vacuum tight Mixer. Available with stainless steel seamless jacketed cans and up to 1 HP exp. prf. motor drive.



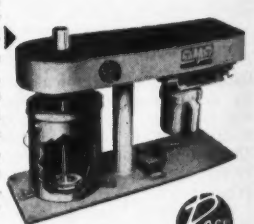
#41A—1 Pt. Double Arm Kneader. Easy to clean, jacketed, and with vacuum cover when required. 1 Pt.—150 gal. sizes.



#52LC—4½"x10". Three Roll Mill with water cooled rolls, one point adjustment and quick roll release. 2½" x 5" — 16" x 40" sizes.



#70—H size 4 Dry Grinding Mill Variable speed drive, with 1" feed size ground between ⅛" and #100 mesh as required. Many sizes including other type Disintegrators, Crushers and Pulverizers.



#140DL — High Speed Disperser with specially designed multiple action Millhead. Variable speeds up to 8000 FPM produce tremendous impact, abrasion and hydraulic shear. Laboratory or production sizes.

Write for complete information!

CHAS. ROSS & SON CO., INC.
Leading mfgrs. of wet or dry grinding Mills, Kneaders and Mixers of all types — since 1869.
154 CLASSON AVE., BROOKLYN 5, N. Y.

Check 4459 opposite last page.

0.0071" hole size, 50% open area on screens

Stainless steel screens with hole sizes as small as 0.0071" are on the market. Open area is 50%. Center spacing measures 0.0098". Units are uniformly etched on staggered centers and can be used for high temperature and abrasive conditions.

Screens having 0.012" and 0.014" hole size are also available. Open area for these are 55 and 65% respectively.

(Screens are product of Pyramid Screen Corporation, 181 Harvard Street, Brookline 46, Boston, Mass.)

Check 4525 opposite last page.

Infrared ovens have only two basic parts

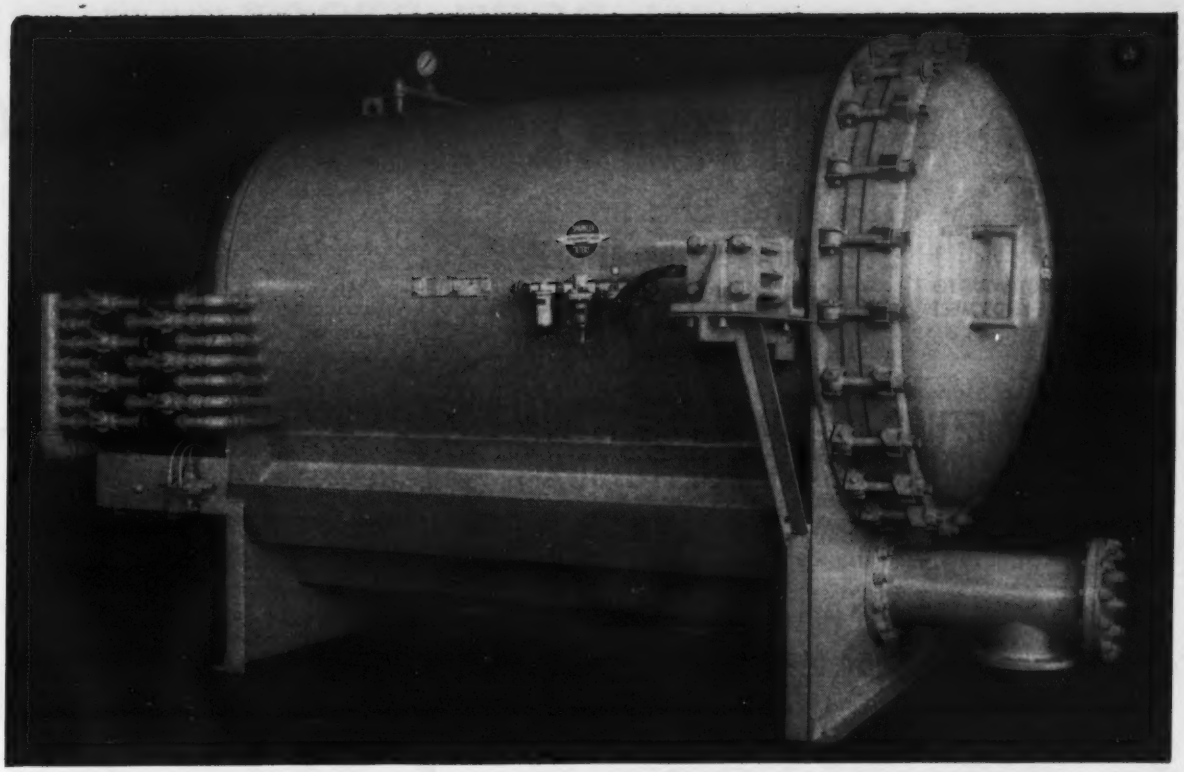
Complete line of infrared heating equipment and ovens for industrial application has been announced by manufacturer. Ovens include batch type, vertical, horizontal, portable, tower, coal and ore carthawing types. Units for use with monorail or floor conveyors are also available.

Equipment is divided into two series: the "L", in which all linear heat sources may be used; and "G", in which lamps are spaced on 12" centers. Only two basic parts are required — modular sections and frame wireway or frame. Heat sources offered are metal-sheath heaters, quartz tubes, quartz tungsten lamps or tungsten lamps.

(Further information about infrared ovens may be obtained from Radcor, Inc., Subsidiary of Edwin L. Wiegand Company, Bradner, Ohio.)

Check 4526 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.



A NEW AUTOMATIC FILTER

Has horizontal plate cake stability plus automatic cake discharge

SPARKLER Model HRC

Filters with plates in horizontal position thus assuring complete cake stability, no danger of cake cracking or breakthrough under any operating condition or even with complete shut down.

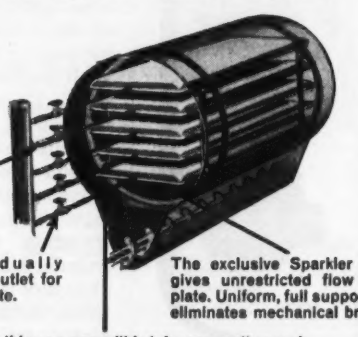
To clean; cake is blown dry. Each plate operating with individually valved outlets and sight glass. Then plates are rotated to vertical position and the cake drops off with the aid of a vibrator and is expelled by a worm screw in the bottom of the tank in semi dry state or can be furnished without screw for liquid slurry discharge. The complete cleaning operation is performed without opening the filter, a completely enclosed system.

All operations of the filter including precoating and cleaning can be fully automated.

Write for complete information

Diagram of operating position of plates during precoating, filtering, and blow down. Horizontal position assures positive cake stability.

Diagram of operating position of plates during cleaning, with plates rotated to a vertical position.





Sight glass for each plate is provided on outlet to give a continuous check on clarity during filtering and to determine when cake is dry during blow down.

Individually valved outlet for each plate.

The exclusive Sparkler plate construction gives unrestricted flow through the filter plate. Uniform, full support of the filter media eliminates mechanical breakage.

Flexible non-corrodible tube connecting each plate with individual outlet. Flexibility of this connection permits rotating of the plate assembly for cleaning.

Dry cake falls off vertical position of plates and drops into trough bottom to be expelled with screw conveyor.

Vibrator rod connects through tank wall with linkage on plates to drop cake.

SPARKLER FILTERS

SPARKLER MANUFACTURING COMPANY · Conroe, Texas, U.S.A.

Check 4527 opposite last page.



EASIEST WAY TO MAKE ENDS MEET

VICTAULIC®

The Time-and Job-Proven Method of Reducing Piping Costs

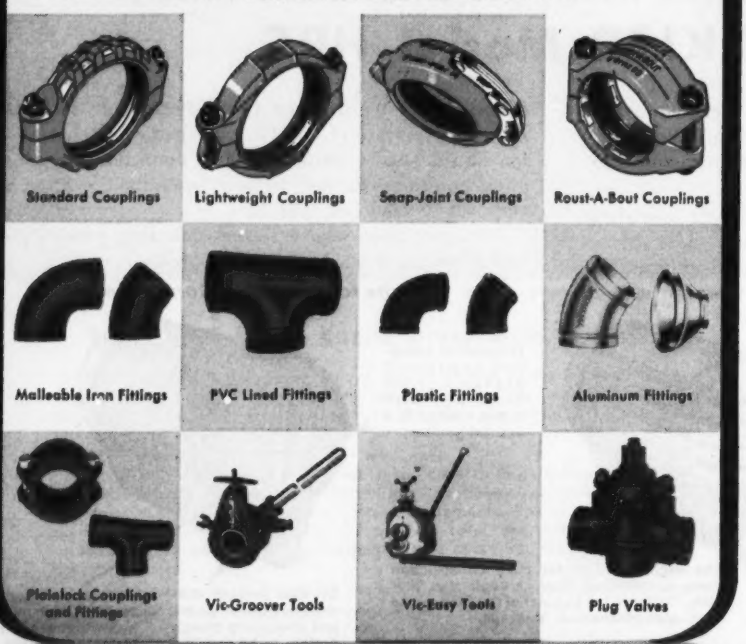
NEW METHOD OF JOINING LIGHT WALL STAINLESS SAVES UP TO 50%



New Victaulic Stainless Steel Fittings (Schedule 5 and 10) joined with Victaulic Couplings give you these advantages:

- Low initial material cost
- Faster and easier to install than flanged or welded systems
- Mechanical lock at every joint
- Piping take-apart is quick and simple

CUT COSTS WITH OVER 1100 VICTAULIC ITEMS FOR BETTER AND EASIER PIPING



For complete information on any Victaulic product, write:

VICTAULIC COMPANY OF AMERICA

Dept. 83-9, P. O. Box 509, Elizabeth, N.J.

Check 4528 opposite last page.

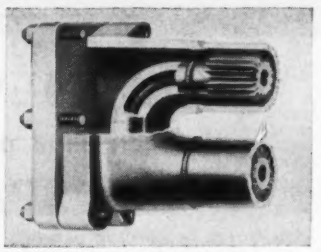
PROCESSING EQUIPMENT

Simplified design cuts cost, speeds maintenance on heat exchangers

Fintube units can handle up to 600 psi

Greater economies in heat exchangers can be realized through use of simply-designed, double-pipe units. Only two ¾" alloy steel studs are needed on tube side connection enclosure. The simplified arrangement reduces cost over conventional double-pipe units having complex bolting mechanisms.

Further economies are achieved by efficient hammer lug which locks head to tube closure by use of only one large, forged hammer-type nut. The hammer ring is easily accessible from front end



Return bend housing of 3" low-pressure, fintube heat exchanger

which simplifies disassembly of the unit.

Tube element can be pulled straight out from shell. There is no need to disconnect any tube side pipe. Misalignment of shell inlet and outlet connection is impossible because shell nozzles are integral with shell. Rear cover closure is made with six ¾" alloy studs.

Units are manufactured in carbon steels, stainless, nickel, monel and chrome-moly alloys. Bi-metal fintube construction is also available. Standard 3" low-pressure exchangers are made with fintubes suitable for 5-600 psi. Units are also available for higher pressure uses.

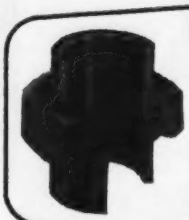
(Further information about double-pipe, fintube heat exchangers may be obtained from Brown Fintube Company, 300 Huron Street, Elyria, Ohio.)

Check 4529 opposite last page.

Catawissa PERFECT SEAL Unions

HOT FORGED from solid, rectangular steel bars, designed and produced for dependable, long-life service under the severest piping conditions!

A TYPE FOR EVERY USE!
FOR ALL PRESSURES!
FOR ALL TEMPERATURES!



Standard & Double Extra Heavy UNIONS

Available with screwed or socket weld ends. 3000-lb. sizes ⅛" to 3"; 6000-lb. sizes ⅛" to 2".



GASKETLESS CUP-ORIFICE UNIONS

Choice of stainless or carbon steel cup-type plate. 3000-lb. service.

MALE & FEMALE UNIONS

With steel-to-steel, bronze-to-steel, stainless steel-to-steel or orifice seats. 3000-lb. service only.



FULL STAINLESS & FULL ALLOY STEEL UNIONS

With screwed or socket weld ends. 3000-lb. and 8000-lb. service.



Write for Catalog 60
Showing the Complete Catawissa line of Perfect Seal Products

CATAWISSA VALVE & FITTINGS COMPANY
CATAWISSA, PENNA.

Check 4530 opposite last page.

NEW LITERATURE
Processing Equipment

Filter media — including paper, metal edge, wire cloth and porous metal units — are reviewed in 18-page booklet. Operating specifications, temperature limits, flow characteristics and typical applications are mentioned for each filter media. Bul IND-1-60 — Purolator Products, Inc.

Check 4531 opposite last page.

Gas diffusion apparatus is illustrated and discussed in eight-page bulletin. Tables compare efficiency with that of conventional equipment on basis of sodium sulfite solution tests. Photos picture cavitation principle of operation which accounts for machine's performance. Bul 150 — Yeomans Brothers Company.

Check 4532 opposite last page.

Activated carbon adsorption systems for solvent and air recovery, or gas and liquid purification and pollution control are described in four-page catalog. Literature depicts three basic types of units, all of which are of the regenerative type. Activated Carbon Resorb Cat — Barnebey-Cheney Co.

Check 4533 opposite last page.

High-capacity sifters are topic of technical data sheet. Included are operating principles, dimensional data, sifting capacities for different screen sizes and recommended uses. Cirlyptic Sifter Data Sheet — Entoleter, Inc.

Check 4534 opposite last page.

Complete line of knife cutters is covered in eight-page bulletin. Available in stainless as well as carbon steel, cutters can be equipment with water-cooled rotary and stationary knives. Table lists specifications for nine models. Bul K-460 — Robinson Division, The Young Machinery Co., Inc.

Check 4535 opposite last page.

High energy dust and fume scrubber is depicted in four-page bulletin. Unit occupies only about one-half the space of conventional scrubbers. Dimensions and performance data are listed. Bul W-8560 — The Ducon Company, Inc.

Check 4536 opposite last page.

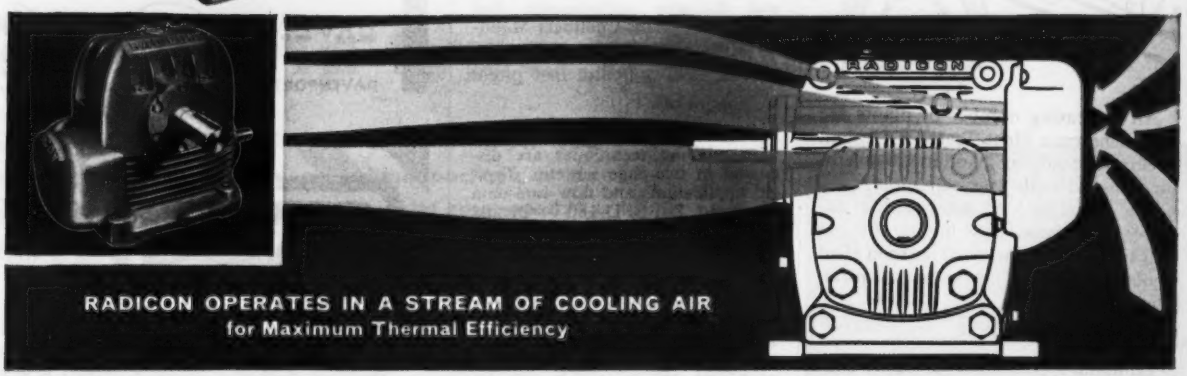
Drum mixing is outlined in 12-page bulletin. Series of charts permit determining the exact size of drum tumbling equipment needed for specific loads to be handled. Bul DM-290 — Process Equipment Division, U. S. Stoneware Co.

Check 4537 opposite last page.

FOOTE BROS. introduces a COMPLETELY NEW line of FAN-COOLED WORM GEAR REDUCERS



- High load carrying capacity
- Rated to NEW AGMA Standards
- Automatic and Positive Lubrication
- 12 sizes—Center Distances from 1⅛" to 8"
- Input ratings: .01 to 66 HP
- Output torque to 46,000 lb. in.
- Ratios from 5:1 to 70:1
- IN STOCK FOR IMMEDIATE DELIVERY



RADICON OPERATES IN A STREAM OF COOLING AIR
for Maximum Thermal Efficiency

Foote Bros. RADICON Worm Gear Reducers incorporate *totally new* and advanced concepts of right angle speed reducer design. Precision gearing with super-finished threads and journals, rugged bearings and shafts, positive lubrication, and carefully controlled production techniques are combined in these compact RADICON Reducers to produce higher load carrying capacity and maximum service life.

Extremely efficient cooling is obtained by the maximum diameter fan forcing air at high velocity along horizontal channels formed by the external ribbing of the housing. This dissipates radiated heat and holds the reducer's temperature rise to a minimum, permitting *identical* thermal and mechanical ratings, in most cases.

RADICON Fan-Cooled Worm Gear Reducers are available FROM STOCK. See them soon, at your nearby Authorized Foote Bros. Distributor. Get complete details on the performance, versatility, and service life they will bring you. Write for Radicon Catalog.

FOOTE BROS. GEAR AND MACHINE CORPORATION
4553 South Western Boulevard, Chicago 9, Illinois

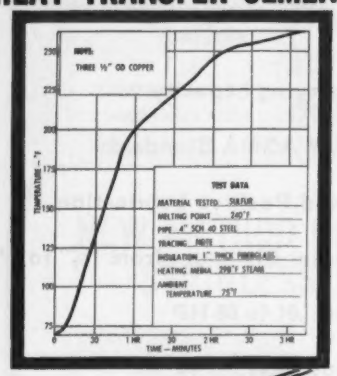
POWER TRANSMISSION DRIVES

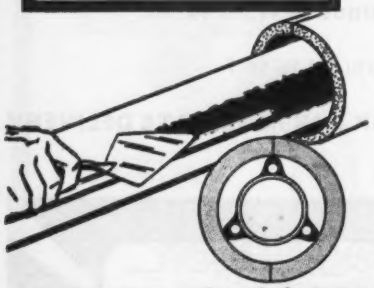
UNLIMITED MOUNTING POSITIONS



Check 4538 opposite last page.

Sulphur Handling is No Problem with THERMON HEAT TRANSFER CEMENT





An increasing number of plants are using Thermon Heat Transfer Cement to eliminate sulphur handling problems encountered with internal tracing and steam jacketing. A non-metallic adhesive compound with highly efficient heat transfer properties, Thermon Heat Transfer Cement in sulphur installations

Eliminates misfitting of prefabricated pipe
Eliminates possibility of cross contamination
Eliminates need for stuffing boxes and packing glands
Reduces cost of installation by *at least one-half*
Reduces maintenance costs

Thermon has been used successfully on pumps, valves and pilot plant and other equipment in sulphur service. Investigate the problem-solving and money-saving properties of Thermon, the *proved* solution to heat transfer problems.

Write for Thermon Bulletin 300.

THERMON
THERMON MANUFACTURING CO.
1917 Rosine • P. O. Box 1961
Houston, Texas 119

Check 4539 opposite last page.

PROCESSING EQUIPMENT

Industrial ovens are reviewed in four-page illustrated brochure. Over 20 batch loading and conveyor types are shown. Bul 127 — W. S. Rockwell Company.

Check 4540 opposite last page.

Unit that intimately mixes dry and semi-dry materials continuously is reviewed in four-page catalog. Uses in chemical and food fields are reviewed. Cut-away drawing shows design features. Bul "Turbulizer" — The Strong Scott Mfg. Co.

Check 4541 opposite last page.

Advantages of permanent magnetic pulleys are outlined in six-page brochure. Guide for correct selection of the devices is also included. "Permanent Magnetic Pulleys" — Eriez Manufacturing Co.

Check 4542 opposite last page.

Vibrating mill, 30" in diam, is said to cost only 1/3 that of conventional machine having same capacity. Two-page bulletin pictures unit and discusses performance. Bul 07B9582 — Allis-Chalmers Manufacturing Company.

Check 4543 opposite last page.

Porous-metal filter media made by wire winding techniques are discussed in two-page bulletin. Typical applications and flow rate data are listed. Bul BFD-180 — Bendix Filter Division, The Bendix Corporation.

Check 4544 opposite last page.

Direct, gas-fired air heaters for use with ovens and dryers in applications up to 600°F are reviewed in four-page brochure. Design features and specifications are listed for six heaters ranging in capacity from 250,000 to two million Btu per hour. Bul 129 — W. S. Rockwell Company.

Check 4545 opposite last page.

Centrifugal dust collectors are outlined in six-page brochure. How large tubes give higher efficiencies and resist plugging are told. Two nomograms help determine collector efficiency and provide means for selecting proper size unit. Bul 1928 — American-Standard Industrial Division, American Radiator & Standard Sanitary Corporation.

Check 4546 opposite last page.

Blow-molding machine, of dual-manifold type, is described in four-page folder. Specifications are listed. Short discussion about blow molding is also included. Bul 291 — F. J. Stokes Corporation.

Check 4547 opposite last page.



Is Corrosion or Contamination A Problem in Your Present Drying Process?

The accompanying photo shows "DAVENPORT" dryer shells and components being fabricated from stainless steel an absolute necessity where corrosion and contamination are factors.

Let our engineers consult with you on your Pressing, Drying and Cooling problems or send for our catalog C, For quick reference consult your Chemical Engineering Catalog.

DAVENPORT MACHINE AND Foundry Company
DAVENPORT IOWA, U. S. A.

DAVENPORT
PRESSING — DRYING and COOLING Equipment
Continuous DeWatering Presses
ROTARY DRYERS
Steam Tube, Hot Air and Direct Fire
Atmospheric DRUM DRYERS
ROTARY COOLERS
Water and Air

Check 4548 opposite last page.

KNOX



DIRECT FROM MANUFACTURER To YOU!

Tower Packings

KNOX produces porcelain tower packings from the same composition as is used for high voltage electric porcelains.

Resists high temperatures, fumes, vapors, corrosion, liquids, alkalies and acids.

Non-porous — complete vitrification firing 2300°F. provides zero porosity, thus assuring an indefinite life chemically.

Uniform quality—high chemical purity—iron-free—great mechanical strength—will not crumble.

If you're interested in Better Tower Packings at lower Operating Cost, we'll be glad to send more information, prices and samples on request.

IRON FREE

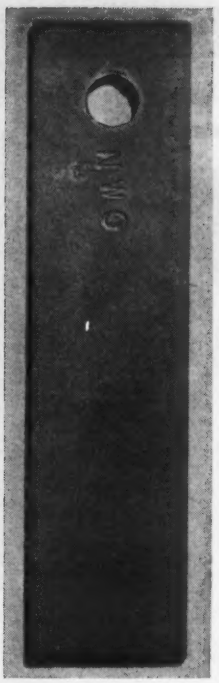
Always Specify KNOX Tower Packings

KNOX PORCELAIN CORPORATION
KNOXVILLE 1, TENNESSEE

Check 4549 opposite last page.



Before microbiological treatment, coupon showed severe pitting and heavy loss of metal



After 11 months of microbiological control, pitting has been completely eliminated

Microbiological corrosion controlled by amine-type treatment

Fantastically high corrosion rate of 35 mils per year caused by sulfite-reducing and slime bacteria is decreased to 1 mpy through use of special compound



Magnified view of portion of coupon installed in system before microbiological control shows smooth-sided pit with concentric circles around main penetration. This type of pit is characteristic of that produced by sulfate-reducing bacteria

PROBLEM: Large petroleum refinery in the southern part of Texas had a severe corrosion problem in recirculating cooling water system initially believed to be due entirely to the aggressiveness of the water.

Cooling system is an open-recirculating setup servicing heat exchangers and open-box coolers. Holding capacity of cooling system is about 250,000 gal. Make-up water is added at a rate of about 150 gpm. Metal contacted by water is mainly mild steel although some admiralty heat exchanger tubes are present.

Usual inhibitor program was started but failed to reduce the corrosion appreciably. Corrosion coupons were inserted to determine extent of corrosion. Rate was fantastically high — 35 mils per year — even though the corrosion inhibitor program was in effect. Corrosion coupons were covered by a slimy, black deposit.

Solution: Coupons gave more information about the attack than just the high rate. They showed that a pitting attack was occurring, not the usual type of pit with jagged edges, but a characteristic smooth-sided pit with concentric circles around the main penetration. This type of pit is characteristic of that produced by bacteria, specifically the sulfate-reducing type.

There are several organisms grouped under this classification. All of them are characterized by their ability to utilize sulfur compounds, such as sulfates, in their metabolic processes to produce sulfides.

Although sulfate-reducing bacteria are considered to be anaerobic in nature, they are quite common in highly aerated systems such as cooling towers.

Other organisms in the system form deposits which shield sulfate reducers and produce anaerobic conditions necessary for their rapid growth. Contamination of water with hydrocarbons, with their accompanying sulfides and mercaptans, provides nutrient for these bacteria. Presence of dirt or debris in system contributes to deposits to produce anaerobic conditions.

Action of sulfate-reducing bacteria in corrosion process is considered to be one of a depolarizer. Reduction of sulfates to sulfides must be accompanied by oxidation. As long as hydrogen is present as a film on metal surface, it acts as a polarizer and stifles corrosion. When film is removed by such agents as oxygen or bacteria, localized corrosion or pitting starts. This type of corrosion is more objectionable than general corrosion involving the same amount of metal because it is more conducive to the development of leaks.

Microbiological analyses were performed on water and sludge samples from cooling tower system at petroleum refinery to verify presence of corrosive bacteria. Results indicated extremely high counts of the sulfate-reducing and

slime bacteria. The latter were probably serving as a protective shield for the anaerobic bacteria.

In May 1958 microbiological treatment with a compound specific for bacterial contamination started. No. 321 is an amine-type material for control of both microbiological growth and corrosion. This amine material in alcohol cosolvent is non-phenolic and non-corrosive, with following properties:

Color	Amber
Odor	Mild
Sp gr	0.946
Flash pt, COC	90-95°F
pH, as drummed	8.0
Freezing pt	−10°F

Dosage was 50 ppm twice per week, based on holding capacity of system.

Results: After first treatment, all deposits on coupons were removed. After three or four days, only about 20% of deposit was rebuilt as compared to 100% replacement previously. Corrosion rates began to drop and slime deposits on cooling tower began to clean up.

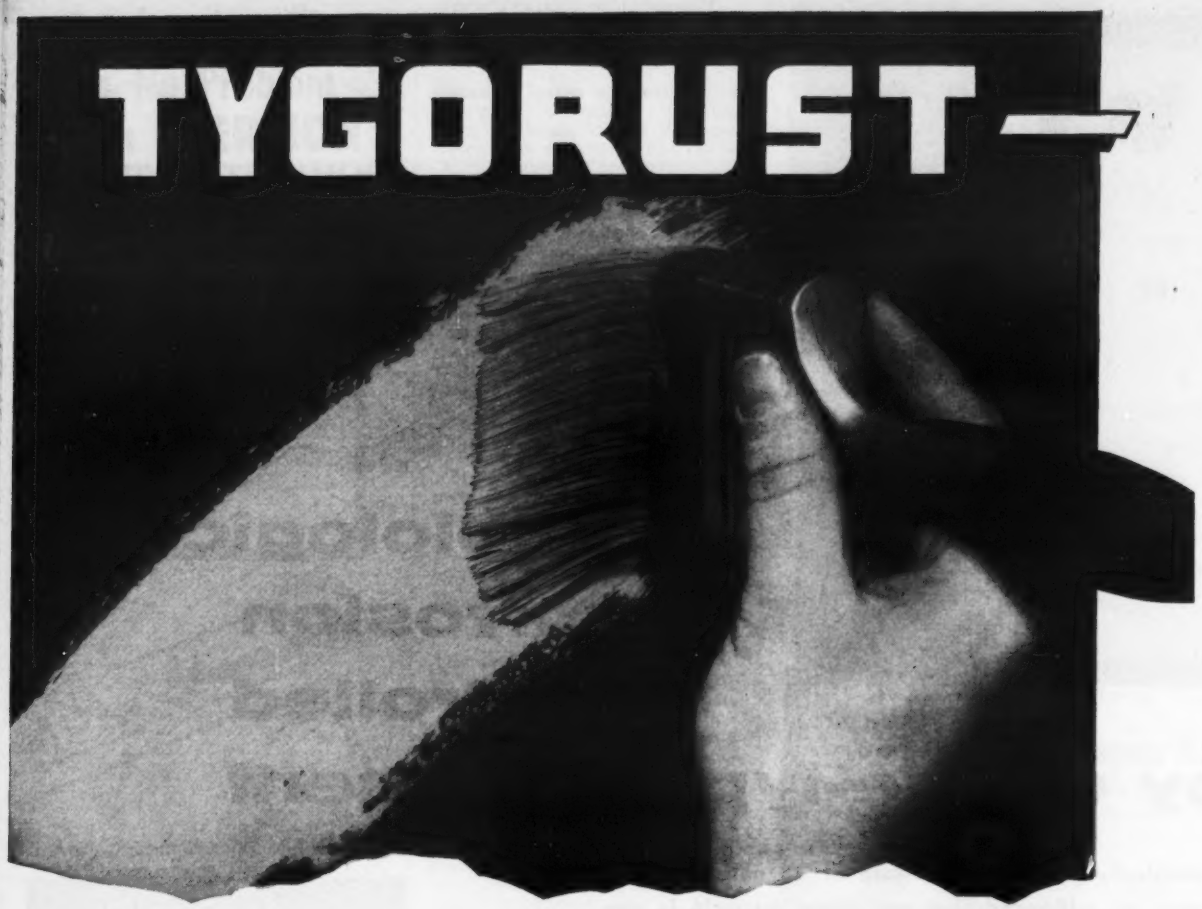
After two months of treatment, analysis still showed presence of some sulfate-reducing bacteria but drastically reduced. Corrosion rates were better, with some pitting being present. Plant personnel remarked that the system was the cleanest they had ever seen it.

By February 1959, only very slight pitting was noted, with corrosion rates reduced to 1.4 mpy. Treatment was reduced to 50 ppm of 321 compound per week.

By April 1959 corrosion rates were reduced to about 1.1 mpy, with no pitting noted. Microbiological analyses indicated practically no sulfate-reducing bacteria with a slight count of other organism. Treatment is being continued to prevent regrowth of organisms.

(Microbiological corrosion control program using Nalco 321 compound was conducted, in cooperation with petroleum refinery, by Nalco Chemical Co., 6216 West 66th Place, Chicago 38, Ill.)

Check 4551 opposite last page.



locks vinyl top coats to damp or dry rusted steel

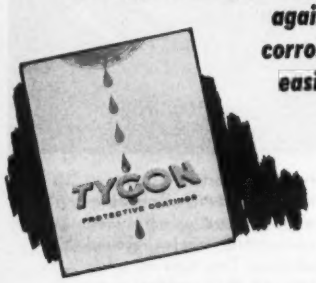
- ***Holds surface preparation to a minimum***
- ***Can be top coated within an hour***

Tygorust Primer licks the big problem in using vinyl-based protective coatings: **Adhesion.** Not only does Tygorust assure a well bonded top coat to the steel it is to protect, but it does it economically.

Forget sandblasting. Tygorust actually works better on rusted surfaces. Just wire brush loose or flaky rust and apply Tygorust. The steel can be dry or damp — it makes no difference. (You can brush or spray Tygorust on dry steel—damp steel should be brushed.) Use Tygorust on concrete, too.

You can overcoat Tygorust with any finish material; but for real corrosion-resistance, make the finish coats Tygon—the corrosion-resistant paint that has stood the test of time.

This FREE Painting Manual can help make your fight against corrosion easier



Contains a wealth of practical data in its many sections: how to simplify surface preparation; what top coating to use for over one hundred corrosive conditions; how many coats; how to maintain coatings in good condition; common spraying troubles and how to remedy them. It's free on request. Ask for the Tygon Painting Manual.

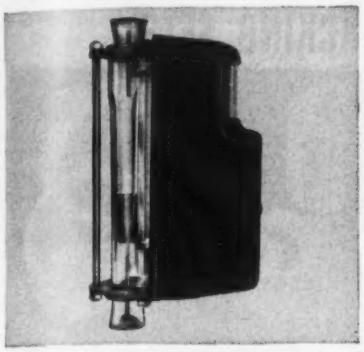
Plastics and Synthetics Division

U. S. STONEWARE
AKRON 9, OHIO

342E-1

Check 4550 opposite last page.

METERING CORROSIVE FLUIDS? Brooks can give you an all-glass *transmitting* rotameter like this . . .



or one with a halofluorocarbon metering tube like this . . .



In fact, we can make a meter to just about any material specifications you might want.

This eight-page bulletin . . .



describes more than a dozen of the many materials available and gives meter construction details. Ask for Bulletin 150, and it's yours.

BROOKS ROTAMETER COMPANY
960 A STREET
LANSDALE • PENNSYLVANIA
BA2177

Check 4552 opposite last page.

Selective corrosion of welded zirconium solved

Studies have shown that selective corrosion can occur when commercially-pure, welded, zirconium components are exposed to hot hydrochloric acid. The situation first came to light when a welded zirconium tube failed in an environment of 15% HCl-85% organics solution at 240°F.

The attack is of a localized nature occurring in a narrow band adjacent to the weld. Little corrosion is present on the weld or parent stock.

An environment of 33% HCl at 300° was found to cause duplication of the field failure. Investigation determined that the attack is intergranular — tentatively ascribed to a galvanic mechanism involving alpha zirconium and the grain boundary precipitate.

Tests showed that welded samples of commercially-pure zirconium heated to within the beta zirconium region (to 1800°F) for 40 minutes and subsequently slow cooled through the alpha-beta region exhibited highest corrosion rates. On the other hand, such samples quenched in water were found to resist selective attack. This procedure is a good remedial measure.

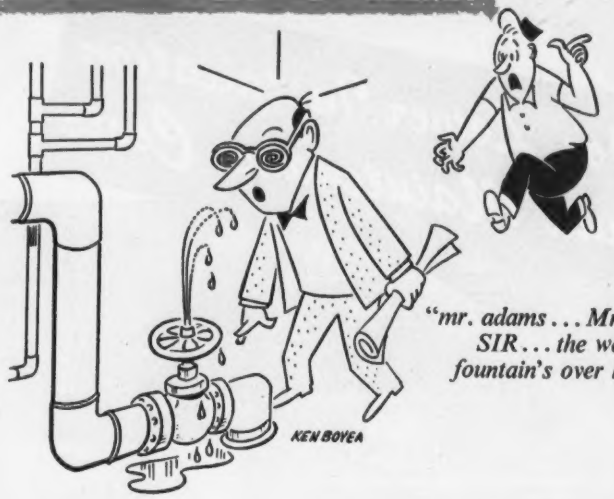
Purity of zirconium also plays an important part. As-welded high-purity material shows no signs of corrosion adjacent to the weld as does the commercially-pure material. Consequently, heat treating and water quenching are not required.

(Condensed from technical paper "Intergranular Corrosion of Commercially Pure Zirconium", by B. S. Payne and D. K. Priest, The Pfaudler Division of Pfaudler-Permutit, Inc.)

(Further information about "Intergranular Corrosion of Commercially Pure Zirconium", may be obtained from The Pfaudler Company, Division of Pfaudler-Permutit Inc., 1000 West Avenue, Rochester 3, New York.)

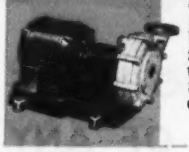
Check 4553 opposite last page.

Life in these excited states...



"mr. adams . . . Mr. Adams . . . SIR . . . the water fountain's over here!"

"WAM" PUMP — *finest you can buy*



Highest pumping efficiency, with faultless corrosion resistance. Hard rubber casing and impeller; Hastelloy *C* shaft. 80 gpm. *Bul. CE-55.*

THRIFTY-THROATED VALVES



Liquids never touch metal in Ace diaphragm valves! Rubber or plastic-lined cast iron, or solid plastic bodies. Sizes ½ to 6". Ask for facts.

ACE-ITE — *all-purpose toughie*



High-impact, rubber-plastic, most economical for average chemicals. ½ to 6". Screw or solvent welded fittings. Valves ½ to 2". NSF-approved. *Bul. 80A.*

RIVICLOR — *equal strength*



All-purpose rigid PVC. Sched. 40, 80 & 120, ½ to 4". Threaded or socket-weld fittings. Valves ½ to 2". NSF-approved. *Free Bul. CE-56.*

Why men of vision choose ACE equipment

Men with a weakness for profits somehow manage to keep equipment "on stream" full time with no corrosion shutdowns. You'll find they reach for Ace corrosion-engineered equipment time and again. Now nine kinds of Ace pipe . . . plus pumps, valves, tanks, and special equipment to solve most any corrosion or contamination problem.

ACE *chemical resistant equipment*
BY **AMERICAN** HARD RUBBER COMPANY
DIVISION OF **AMERACE** CORPORATION
ACE ROAD • BUTLER, N.J.



See ACE equipment in Chemical Engineering Catalog

Check 4554 opposite last page.

"KEMITE"

For Lower Installation and Maintenance Costs



FLEXIBLE RUBBER PIPE FOR THE SAFE, EFFICIENT HANDLING OF ANY CORROSIVE OR ABRASIVE MATERIAL

Hot or Cold . . . Wet or Dry

Extreme flexibility permits installation of "Kemite" Duct in long, curving lines with few intermediate connections. Connections are quickly and easily made by use of "Flang-Lok" Flanges (see insert) which provide a non-metallic, permanently leakproof seal. "Kemite" is built to combat costly maintenance, repairs and early replacement. Tube is highly resistant to extremely corrosive or abrasive materials. Patented wire-reinforced carcass will not kink or collapse. Cover is tough, durable and impervious to the actions of acids and fumes. Standard sizes: 1" to 4". For suction and discharge.

Contact Our Nearest Branch for Details and Prices

"If it's GOODALL, it MUST be Good!"

See Pages 338-339, Chemical Engineering Catalog

Standard of Quality—Since 1870

HOSE · BELTING · FOOTWEAR · CLOTHING AND OTHER INDUSTRIAL RUBBER PRODUCTS

GOODALL *Rubber Company*

GENERAL OFFICES, MILLS and EXPORT DIVISION, TRENTON, N. J.

BRANCHES AND DISTRIBUTORS THROUGHOUT THE UNITED STATES IN CANADA: GOODALL RUBBER CO. OF CANADA LTD., TORONTO

Check 4555 opposite last page.

CORROSION CONTROL

One-package pre-primer protects metal surface

Uses: For combating surface contamination on clean metal and after sandblasting old surface. It also serves to improve adhesion, insuring tight bond between primer and metal.

Features: Tests conducted by four different organizations have shown the product to be the best one-package wash primer among those tested and equal to two-package primers.

Description: Pre-primer remains stable for an indefinite time, even after thinning. One gallon, after thinning, will cover about 300 sq ft. It may be brushed or sprayed on and dries in 15 to 20 minutes.

(Pre-primer Bonderite is product of Tropical Paint Company, subsidiary of Parker Rust Proof Company, Cleveland 2, Ohio.)

Check 4556 opposite last page.

PVC fume scrubbers resist corrosion, take little space

Uses: Removing acid fumes from air or gas streams.

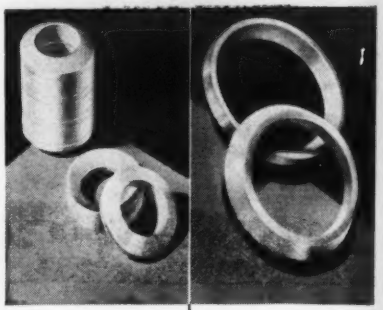
Features: Scrubbers are made entirely of rigid polyvinyl chloride, including frame, tubing, nozzles, fittings and Raschig ring bed. Only the base and mounting channel which are outside corrosion area, are made of metal.

Description: Machines are designed to withstand corrosion and minimize water consumption and installation costs. Use of PVC also minimizes danger of contamination, making scrubber adaptable to recirculating systems. Plastic construction results in light weight. A 30,000 cfm unit weighs only 1800 lb — about 1/6 that of a steel machine.

Three-step process assures 90 to 99% removal of acid contaminants. Fume-laden air first enters section of washer where it loses velocity and is washed by system of spray nozzles.

It then passes through Raschig ring scrubber bed. Direct action of additional spray

NEW CHEMPRO LOW GLAND PRESSURE TFE TEFLON† PACKING SETS



"CUP AND CONE" "WEDGE"

USED FOR VALVES, HEAT EXCHANGERS AND OTHER STATIC AND SEMI-STATIC APPLICATIONS

Chempro Style 300 "Cup & Cone" and Style 305 "Wedge" packing ring sets are two new resilient, low gland pressure packings designed for tight, sure sealing with a minimum gland pressure. Nominal gland pressure causes the rings to slide against each other, exerting pressure both against the stem or rod and the bore.

These packings have all the advantages of Teflon, being completely unaffected by the strongest acids, solvents and alkalies.

COMBINATION SETS AVAILABLE FOR ROTATING SERVICE

Resilient Chempro "Cup & Cone" or "Wedge" rings can be combined with tough, pressure-resisting Chempro Style 101 packing rings to form a rugged combination set ideal for use on a wide range of rotating or reciprocating services.

Write for revised Chempro Bulletin CP-552, giving complete ordering information.

† duPont trademark

CHEMICAL & POWER PRODUCTS, Inc.

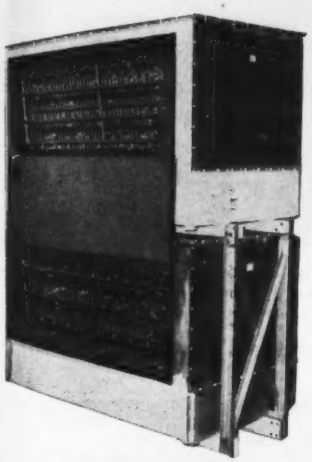
9 Broadway, New York 4, N. Y.

Check 4557 opposite last page.

nozzles assures clean surface for maximum adsorption of contaminants. Any particles of heavily entrained water still remaining in air are removed in eliminator section.

Water consumption is about one-half to two gpm per 1000 cfm of air handled. Pressure drop across scrubber is only ¾", minimizing power consumption.

Scrubbers are available in capacities ranging from 1000 to 55,000 cfm. Units can be used individually or in combination with others. For example, two 15,000 cfm models may be stacked together to obtain 30,000 cfm capacity. A 15,000 cfm scrubber measures 66" high, 102" wide by 52" deep. Stacking minimizes floor space requirement and also permits use of only one plenum and plumbing location.



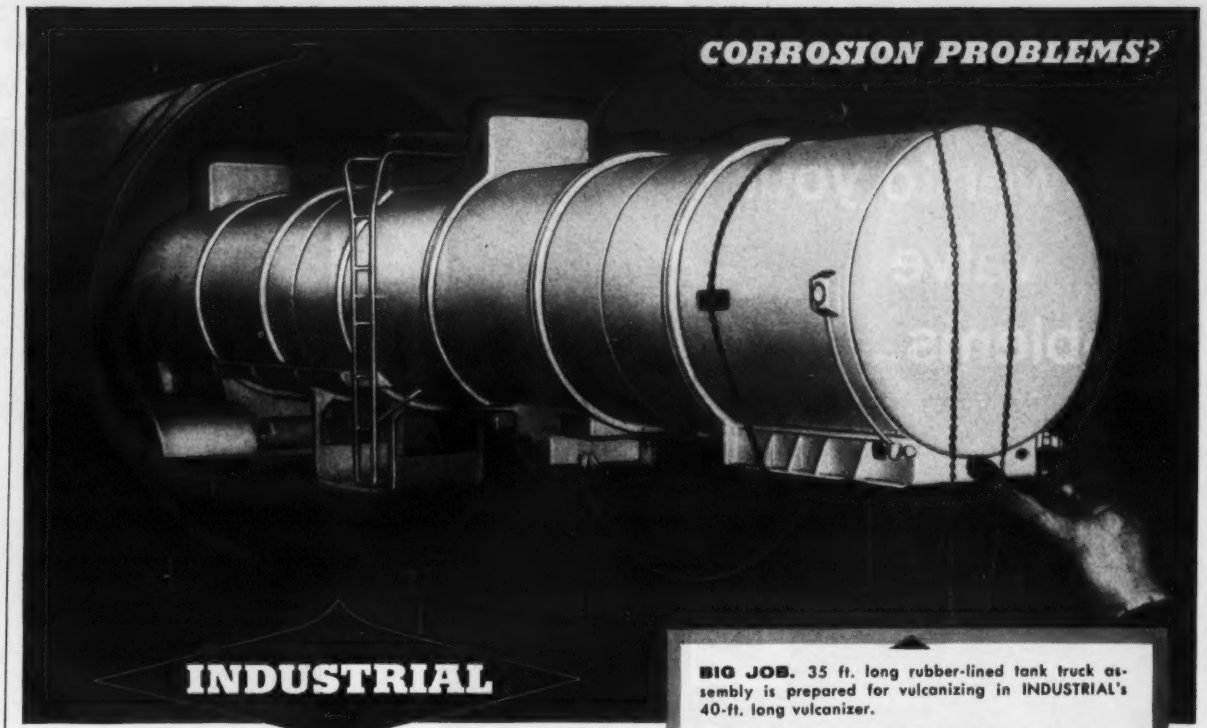
PVC fume scrubber made up of two 15,000 cfm units. Stacking boosts capacity to 30,000 cfm, saves floor space

(PVC scrubbers are product of S & C Manufacturing Company, 3533 Cardiff Ave., Cincinnati 9, Ohio.)

Check 4558 opposite last page.

NEXT MONTH

Having a tough corrosion problem? Read Atlas Powder's experience in use of Teflon-lined pipe on Stengel NH_4NO_3 process. Full details of solution to problem of handling boiling NH_3 in October CP.



For Skilled Rubber Surfacing

. . . these complete facilities insure a *better* job at *lower* cost

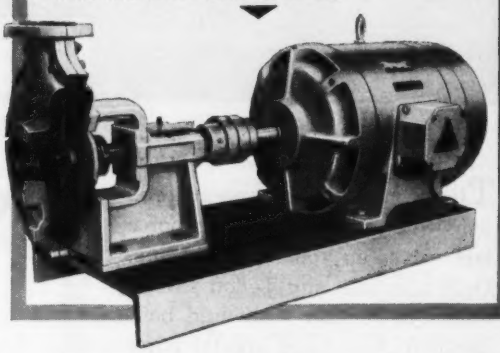
INDUSTRIAL operates one of the largest rubber compounding and lining plants outside of the rubber industry. Here, tons of raw rubber are maintained in stock for formulating and compounding into compression molds and rubber linings to meet the *most specific* corrosion or abrasion-resistant services.

This extensive facility permits INDUSTRIAL to maintain the highest standards of quality control for rubber-lined processing equipment designed and built by INDUSTRIAL. In addition, it also provides a skilled, experienced and well-equipped source for *custom* sheet lining and compression molding to meet individual requirements.

All the benefits of INDUSTRIAL'S experience in designing, engineering and producing rubber components, and for applying it to the most intricate surfaces, is described in our RUBBER DIVISION bulletin. Write for your copy, today.

BIG JOB. 35 ft. long rubber-lined tank truck assembly is prepared for vulcanizing in INDUSTRIAL's 40-ft. long vulcanizer.

SMALL JOB. INDUSTRIAL rubber-lined Centrifugal Pumps give long life with minimum maintenance on the most severe corrosion service.



INDUSTRIAL Centrifugal Pumps are specifically designed for rubber lining. **As a result, they characteristically provide long, trouble-free life in corrosive or abrasive service . . . offering these design benefits:**

- **Mechanical Seal or stuffing box**
- **Easy access to pump seal**
- **Quick adjustment of impeller clearance**
- **Teflon seal cage (stuffing box only)**
- **Impeller insert welded to shaft**
- **One-piece, maintenance-free rotating element**

INDUSTRIAL

INDUSTRIAL FILTER & PUMP MFG. CO.
5908 Ogden Avenue,
Cicero 50, Illinois

C-159

Check 4559 opposite last page.

Acid-proof answer to your valve problems...



Lapp PORCELAIN VALVES!

THERE *are* no valve corrosion problems when you install Lapp porcelain valves on your chemical lines. Only porcelain and Teflon packing comes in contact with fluid being handled. And Lapp special porcelain is hard, dense and pure . . . homogeneous, non-porous and chemically inert . . . therefore impervious to corrosion from acids of all concentrations, except hydrofluoric.

WRITE on your letterhead for Catalog 567. It will put complete information on chemical porcelain at your fingertips. Lapp Insulator Co. Inc., Process Equipment Division, 2109 Poplar Street, LeRoy, N. Y.

Lapp

3 BASIC TYPES MEET VARIED REQUIREMENTS



UNARMORED—Valve body of white glazed porcelain. Maximum recommended temperature, 350° F.



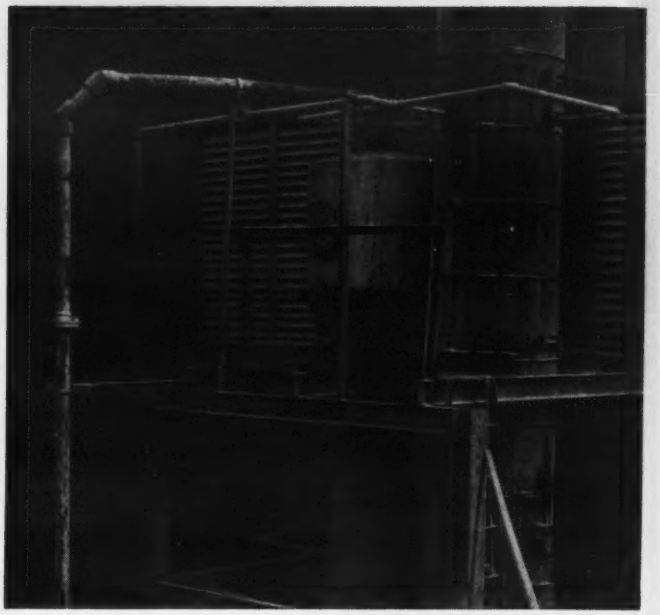
TUFCLAD® ARMORED—Porcelain body with exclusive Lapp armor casing of resin bonded fiberglass...for applications where accidental damage of porcelain becomes an immediate hazard to personnel or product. Maximum temperature, 225° F.



ALUMINUM ARMORED—Recommended where armoring is needed and service temperature exceeds that of Tufclad. High strength silicon aluminum casting is cemented over porcelain body. Maximum temperature, 400° F.

All valve types are proof-tested leak free at 150 psig. —recommended for operation at 50 psig.

Check 4560 opposite last page.



Polyvinyl chloride pipe (left) carries corrosive hydrofluosilicic acid from tank into top of stainless-steel scrubber. Wooden column at right serves as acidulating tower for phosphate rock

Still going strong after four years of rugged service, PVC pipe proves that it is the . . .

Low-cost way of handling corrosive H_2SiF_6

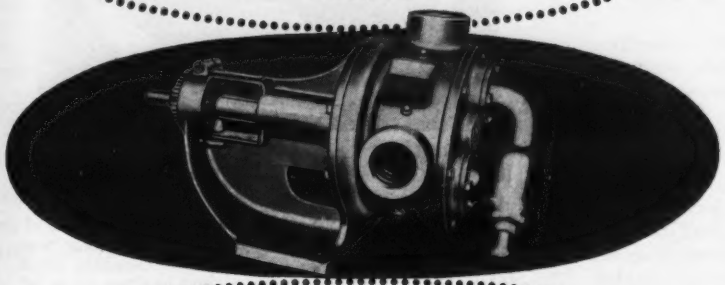
Hydrofluosilicic acid (H_2SiF_6) — the culprit that seems to have a special appetite for glass, stoneware and most metals — has been successfully subdued by polyvinyl chloride pipe at the Danville, Illinois, fertilizer plant of The American Agricultural Chemical Company. Installed in 1956, the low-cost pipe has seen practically continuous service and shows little, if any, signs of deterioration. Of course, there are specialized metals that could have been used for the job, but their price is considerably higher.

The PVC pipe is used in the superphosphate department in conjunction with a stainless-steel scrubber that recovers byproduct fluorine gases released during phosphate rock acidulating operations. There are 32 ft of 3″-diam PVC pipe serving the unit scrubber. The line runs from bottom of acid recirculating tank, through pump and up into top of scrubber.

Acid is maintained at approximately 60° to 120°F. Specific gravity ranges between zero and 12°Be′. The acid circulates continuously at rate of approximately 100 gpm during scrubbing operation.

In addition to its relatively low initial price and high corrosion resistance, PVC pipe has another big advantage. Its light weight makes it easy to handle and install. Excellent

NOW!
MORE PUMPING CAPACITY
AT LESS COST • WITH VIKING'S
STAINLESS STEEL
PUMPS



You get more pumping capacity from these new Viking heavy duty stainless steel* pumps because they can be operated up to 100% rated speed. By increasing the speed of a Viking pump its capacity is increased correspondingly. Upwards of $300 to $400 can be saved on some pumping applications. ■ Entirely new, modern foundry facilities and manufacturing processes enable the complete line of Viking alloy pumps to meet more exacting requirements than ever before and at higher speeds. ■ If your specifications call for stainless steel or other alloy pumps, see how you, too, can save on the new line of full speed Viking alloy pumps.
*Also Steel, Monel, Nickel, Ni-Resist, Ductile Iron, Other Alloys
For Complete Information, Write For Catalog MCC

VIKING PUMP COMPANY
Cedar Falls, Iowa, U.S.A. In Canada, it's "ROTO-KING" Pumps

See Our Unit In Chemical Engineering Catalog
Check 4561 opposite last page.

New...



high temperature fuel and chemical resistant tape

TEMP-R-TAPE® FR

CHR's pressure-sensitive, TEFLON* tape with fluoropolymer adhesive.

Temp-R-Tape FR, an exclusive development of CHR, has been specifically made for applications where fuel or chemical corrosion resistance is necessary at temperatures as high as 400°F. In addition to meeting these severe service requirements, Temp-R-Tape FR possesses outstanding electrical properties. It is recommended for splicing, harness wrapping and protective covering on engines of all types, hydraulic equipment, chemical pipelines, and all types of mechanical parts.
AVAILABLE FROM STOCK: ¼" to 2" widths, 36 yd. rolls. Special roll widths slit to order. Sold nationally through distributors.
FREE SAMPLE and folder — write, phone or use inquiry service.

ELECTRICAL AND INDUSTRIAL SPECIALTY TAPES
CHR CONNECTICUT HARD RUBBER CO.
*duPont TM
Main office: New Haven 9, Connecticut

Check 4562 opposite last page.

service has also been reported with the pipe in numerous other applications. These include use with highly concentrated oxidizing agents, alkalis, neutral and acid salts and other organic chemicals.

Best results are obtained when pipe is used at temperatures below 140°F. In some cases this can be boosted to 190°F, since temperature limit is decided by pipe's resistance to mechanical distortion instead of corrosive attack.

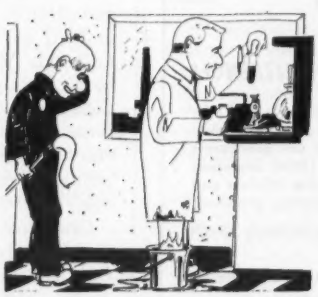
(Further information about polyvinyl chloride pipe may be obtained from National Tube Division, U. S. Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pa.)

Check 4563 opposite last page.

Steam up to 700°F resisted by new aluminum alloys

Group of aluminum alloys have been developed which demonstrate good resistance to corrosive attack from high temperature steam and water. Composed of aluminum-iron-nickel alloys, products reportedly are capable of withstanding 700°F. Possible uses are as cladding for uranium fuel rods in high temperature atomic reactors.

(Aluminum alloys were developed by Research Laboratories, Aluminum Company of America, Alcoa Bldg., Pittsburgh 19, Pa.)



"I hate to disturb you, sir, but . . ."

P TEFLON* TUBING
for your
TOUGHEST PROBLEMS ON
Laboratory Constructions
Special Apparatus
Instruments

PF Teflon furnishes near-miraculous solutions to difficult application problems because of its unique chemical, electrical and mechanical advantages. Wherever tubing has a critical job to perform in electrical, electronic, chemical, food, laboratory, mechanical and other applications, PF Instrument Tubing is the best answer because it:

1. Has an extreme service temperature range from —320° to 500°F.
2. Has excellent dielectric properties and zero moisture absorption
3. Resists almost all chemicals and solvents
4. Is easy to clean or sterilize
5. Is translucent, tough and flexible
6. Will not contaminate a stream

PF extrudes this tubing in all popular sizes from .012" to .330" I.D., thin and standard wall, in a full range of colors.

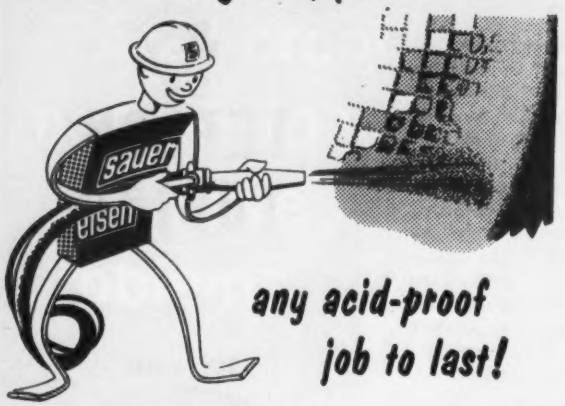
The combination of Teflon's outstanding properties and PF's outstanding engineering and manufacturing techniques can help solve your difficult application problems.

Write, wire or phone for information and advice on your specific applications
P PENNSYLVANIA FLUOROCARBON CO., INC.
1115 N. 30th Street
Philadelphia 4, Pa.
PHONE: EVergreen 6-0603
TWX: PH 252

*Du Pont Reg. T.M.

Check 4564 opposite last page.

You can gunite, pour or cast



any acid-proof job to last!

Yes, Sauereisen Pour-Lay Cement No. 54, the **Acid-Proof Concrete,** is ready to go to work for you, too . . . for floors, tanks, chimneys. Provides resistance to all corrosive acids (except hydrofluoric) and temperatures as high as 2000°F. Can be gunited, poured, cast in forms or applied as a topping over concrete, brick or tile. Ask for Data Sheets. **Sauereisen Cements Co., Pittsburgh 15, Pa.**

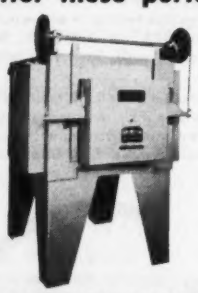
SAUEREISEN POUR-LAY CEMENT **No. 54**
Patent Applied For

Check 4565 opposite last page.

SOLVE HEAT-TREATMENT PROBLEMS

for Glass, Steel, Aluminum, Ceramics, Chemical Processing

ONLY TRENT BOX TYPE FURNACES offer these performance advantages:



- **Controlled, Uniform Clean Heat to 2300°F.**
- **Operate from Standard Voltages**
- **Standard Switches and Controls**
- **Require No Transformers**
- **TRENT "Folded and Formed" Electric Heating Element**

THE HEATING ELEMENT MAKES THE DIFFERENCE!



Surface of continuous "Folded and Formed" ribbon type element faces the work chamber—gives up to *4 times the radiating area* per given cross section of ordinary types! Let TRENT engineers study your needs to determine the efficient and economical solution to your heating problems.

Write for Bulletin 75-TD

TREN INC.
Electrically Heated Industrial Equipment

235 Leverington Ave., Philadelphia 27, Pa.
In Canada
Pioneer Electric Eastern Ltd., Toronto

Check 4566 opposite last page.

CORROSION CONTROL

Just like on a bridge — cable carries stresses in plastic tank

Combination results in strong, corrosion-resistant vessel

Steel cable used in conjunction with polyester resins is resulting in bigger and stronger plastic tanks. The combination is reported to provide an exceptionally high safety factor — even for large tanks.

Basic idea behind design is to transfer the load to steel cables much in same manner as in a suspension bridge.



Steel cable wrapped around plastic tank provides strength and dimensional stability

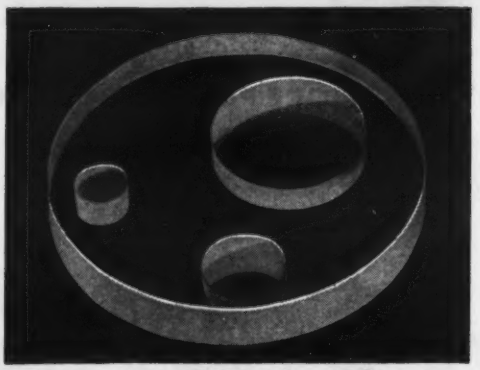
Cable is anchored at top and bottom of tank, but rides freely in slotted seams.

Spacing of the cable windings narrows from top to bottom in ratio to hydrostatic pressure of stored fluid. Spacing is closest at bottom where pressure is greatest.

Another advantage is easy installation. Because tanks are molded in segments, any size unit can be carried unassembled through standard door. Lightweight fabricated sections do not require cranes for erections. Sections can be assembled on the spot using a cold-set bonding process.

Chemical resistance exhibited by polyester resins (either epoxies or furanes) makes tanks highly impervious to most corrosive liquids.

Manufacturer states that use of the steel cables results



NOW! Swift Sight Glasses
With Holes Up To 2" In Diameter

You can now order Swift Sight Glasses with holes from ⅛" to 2" in diameter . . . in nine thicknesses (from ⅛" to 1¼") . . . **in any shape** . . . and in sizes up to 24" by 60" (limited by size of the Pyrex glass). Standard shapes always available for immediate shipment.*

Swift Glasses are precision-ground from Pyrex Polished Plate Glass . . . they won't cloud or pit . . . resist all chemicals but HF and caustic soda solutions.

***A point to remember:** you can take care of **all** your sight glass needs **at one time,** with a single order to Swift.

SWIFT *Glass Division*
SWIFT LUBRICATOR COMPANY, INC.
2 Glass St., Elmira, N.Y.

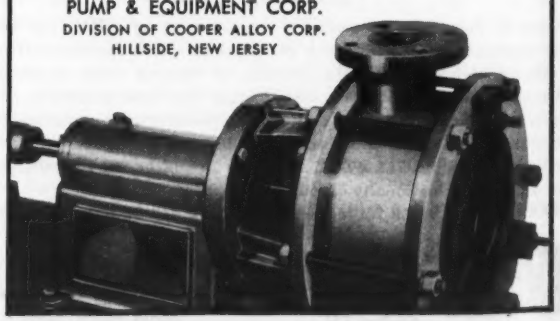
Check 4567 opposite last page.

VANTON CENTRIFUGAL PUMPS IN PVC AND POLYPROPYLENE

TO HANDLE HCl, H_2SO_4, MOST ACIDS, PLATING SOLUTIONS AND MANY SOLVENTS

Because wetted parts are of unplasticized, unmodified polyvinyl chloride or Polypropylene these pumps offer highest corrosive resistance and non-contaminating transfer of sensitive solutions. A broad range of sizes; capacities, 10 through 180 GPM; discharge head to 160 ft; cost, lower than many in special alloys. Mechanical shaft seals of latest design. For all corrosive applications. *Write for catalog.*

Vanton
PUMP & EQUIPMENT CORP.
DIVISION OF COOPER ALLOY CORP.
HILLSIDE, NEW JERSEY



Check 4568 opposite last page.

in a stronger and more economical tank than with either plastic or steel alone. The cable also provides dimensional stability.

(Kabe-O-Rap tanks are product of Metal Cladding Inc., 470 Niagara Parkway, North Tonawanda, New York.)

Check 4569 opposite last page.

New Cu-Ni-Si alloy has high strength, resists corrosion

Density is 0.322 pounds per cubic foot

A corrosion resistant, high strength alloy has been developed consisting of 97.5% copper, 1.9% nickel and 0.6% silicon. Known as Cunisil-837, product possesses good physical, mechanical and fabrication properties.

Compared with free cutting brass rod at 100, its machinability rating is approximately 40. Product has density of 0.322 lb per cu inch. Coefficient of thermal expansion per °F from 68 to 572°F is 0.0000098.

Most of nickel and silicon are present as an intermediate compound of nickel silicide. Precipitation of submicroscopic particles of nickel silicide by relatively low temperature heat treatment accounts for most of the distinctive properties of the alloy.

The alloy is made in round rod. Straight lengths are 3/16 to 1" diam. Coil has 3/16 to ⅝" diam.

Mechanical strengths for precipitation-hardened product are:

Tensile, psi	90,000
Yield @ 50% extension under load, psi	70,000
Elongation in 4xD, %	8
Bend test, degrees of bend (on radius equal to diam)	90

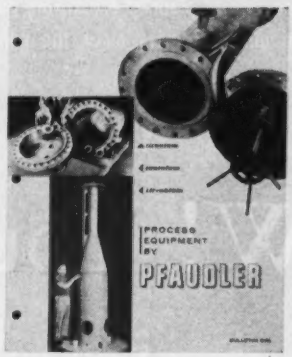
(Further information about Cunisil-837 alloy may be obtained from the American Brass Company, Subsidiary of The Anaconda Company, 414 Meadow Street, Waterbury 20, Conn.)

Check 4570 opposite last page.

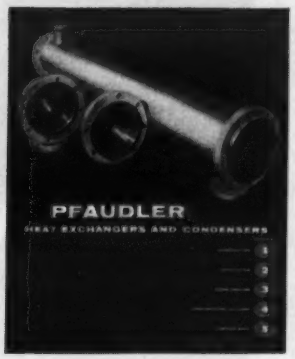
Update Your File on FLUIDICS*



The economies of Glasteel storage. For products that are corrosive, sticky, or cannot stand contamination, Glasteel storage tanks offer a sound solution. Savings accrue through long life . . . are immediate in sizes over 10,000 gallons, since Glasteel tanks cost less than stainless or clad steel. Vertical and horizontal designs in 500 to 35,000 gallons. **Bulletin 975.**



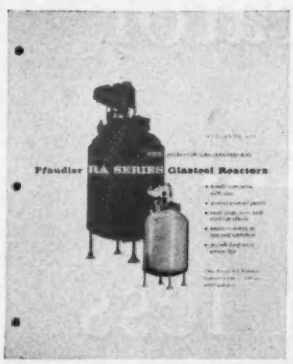
"New" metals for process equipment. Tantalum, titanium and zirconium are finding increased use because of their exceptional corrosion resistance and strength. Corrosion data, along with information on heat transfer and general applications are spelled out, and available equipment pictured, in our **Bulletin 978.**



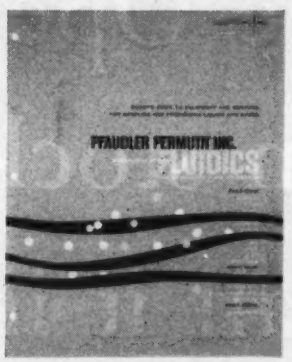
Heat exchangers and condensers from standardized components. A valuable technical reference for the engineers who specify tubular heat exchangers. Covers applications, typical installations, nozzle locations, construction materials, and various designs. Tables show relevant data on pressure loss, conductivity, fouling resistances and physical properties of many heating media. **Bulletin 949.**



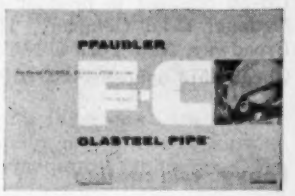
Evaporating "problem" products. The Pfaudler Wiped Film Evaporator is especially efficient in handling products that are heat sensitive, highly viscous, or low in thermal conductivity. Read details of unique positively wiped wall and full specs on sizes, capacities and operating characteristics in **Bulletin 991.**



The latest in reactors. The new RA Series of Pfaudler® Glasteel Reactors offers many important design features — mirror-image top head, offset bottom outlet, engineered agitation, and choice of sizes through 4,000 gallons. The facts on the ability of Glasteel 59 to stand up to thermal shock and harsh corrosives, plus layout drawings and specs, are found in **Bulletin 988.**



How FLUIDICS works for you. This buyer's guide describes the range of equipment for handling corrosives, heat transfer, reactions, centrifuge separations and packaging. It further covers water and waste treatment, ion exchange, gas analysis, metering and control. Discusses available design and engineering services for complete plants or process systems. Check coupon for **Bulletin 992.**



F-C Glasteel pipe† you can "field cut." This new pipe can be readily installed in the field. Inside, the pipe is ⅛"-thick glass for corrosion resistance and product protection; outside, steel for strength. Cut it on any standard dry abrasive wheel; thread, fire polish; thread on flange and belt sand. More facts and installation instructions in **Bulletin 989.**
†Patent applied for

***FLUIDICS** is the Pfaudler Permutit program that integrates knowledge, equipment and experience in solving problems involving fluids.

PFAUDLER PERMUTIT INC.
Pfaudler Div., Dept. CP-90, Rochester 3, N. Y.
Specialists in FLUIDICS . . . the science of fluid processes

- ☐ 975 Glasteel Storage
- ☐ 988 RA Series Reactors
- ☐ 978 Titanium, Tantalum, Zirconium Process Equipment by Pfaudler
- ☐ 992 FLUIDICS BUYER'S GUIDE
- ☐ 949 Pfaudler Heat Exchangers and Condensers
- ☐ 991 Wiped Film Evaporator
- ☐ 989 Pfaudler Glasteel FC Pipe

Name.....Title.....
Company.....
Address.....
City.....Zone.....State.....

Check 4571 opposite last page.

Exterior durability in one coat offered by primer

Exposure and weatherometer tests have shown flash-dry rust-inhibitive primer to offer excellent exterior durability in one coat. Coating will also resist common industrial spillages and fumes.

Coating dries to a tough, flexible finish in 15 minutes. It penetrates deeply into rust pits and other surface irregularities to form a tight bond with the metal surface.

Coating utilizes the rust inhibition provided by a basic lead silico chromate known as M-50 pigment. This product offers a highly active particle surface of basic lead chromate coated over a lightweight silicacore. M-50 pigment has a high degree of rust inhibition.

(Totrust M-50 primer is product of Wilbur & Williams Company, Inc., 650 Pleasant St., Norwood, Mass.)

Check 4572 opposite last page.

(M-50 pigment is product of National Lead Company, 111 Broadway, New York 6, N.Y.)

Check 4573 opposite last page.

Epoxy resin coating for pipe withstands tough abuse

Provides high electrical, mechanical strength

Uses: Protecting pipe and other objects in corrosive service.

Features: Epoxy resin coating cures in less than 20 seconds with close coating tolerances. Product, upon application, is completely thermoset. It will not flow under pressure nor upon heating. Adhesion strength is 3000 psi.

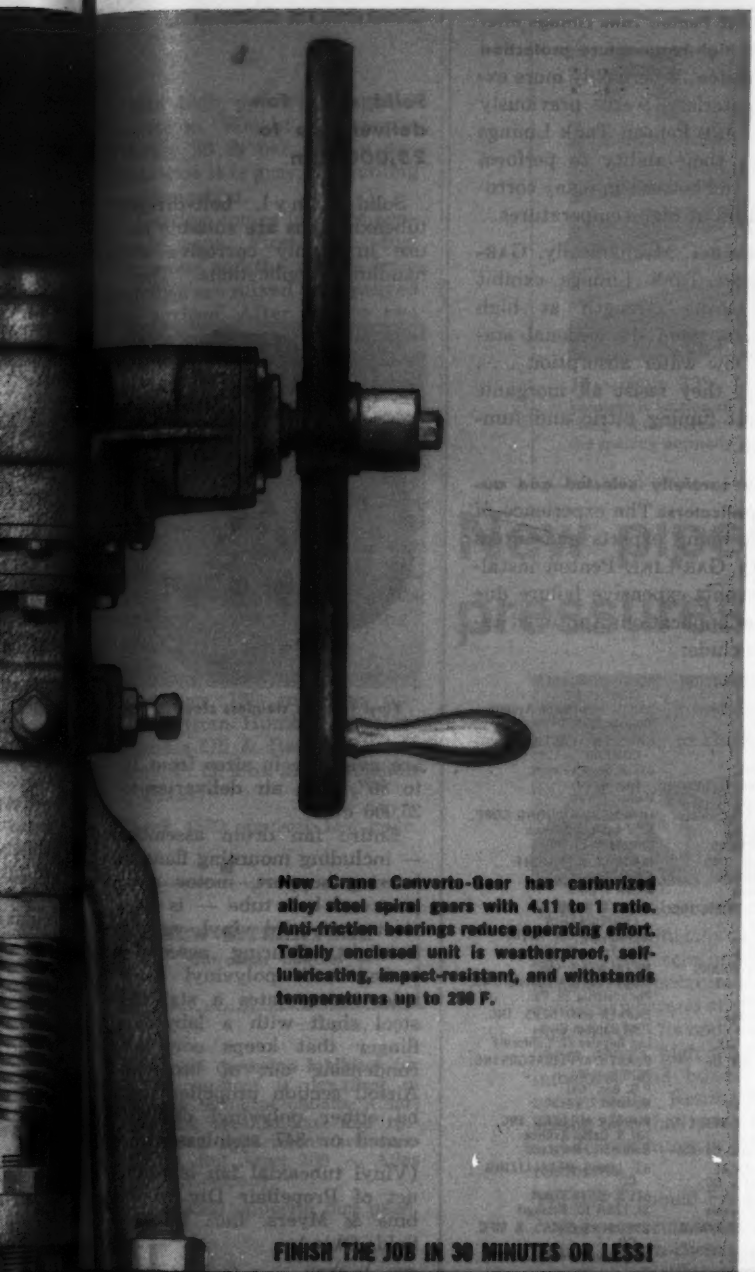
Description: High impact strength of coating resists damage from soil or pipe movement. Product withstands attack by most chemicals, including hydrocarbons such as fuel oil, gasoline, kerosene and sweet or sour crude.

Application consists of cleaning, heating, loading and

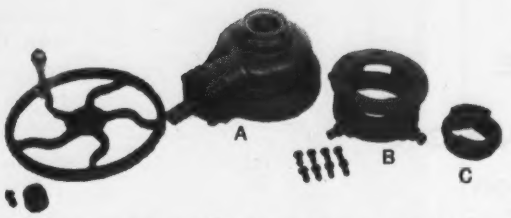
CRANE
DIRECTION '70
. . . a fast-moving program of planned expansion, product development, and streamlined distribution to help our customers meet the competitive challenges of the Sixties.

NEW! You can order this CRANE Converto-Gear Valve Operator from stock... install it in less than 30 minutes





New Crane Converto-Gear has carburized alloy steel spiral gears with 4.11 to 1 ratio. Anti-friction bearings reduce operating effort. Totally enclosed unit is weatherproof, self-lubricating, impact-resistant, and withstands temperatures up to 200 F.



Only three parts needed to convert your OS & Y valve to gear operation: (a) Crane Converto-Gear Operator, (b) adapter for mounting operator on valve, (c) yoke sleeve adapter. Handwheel and mounting bolts furnished with conversion kit.

Now you can convert to rapid, easy gear operation on many of your Crane iron and steel gate valves without removing them from the line! Changeover is simple and fast with Crane's new Converto-Gear Operator.

Your Crane Distributor can give you complete information on this brand-new idea in gear operators for gate valves. The Converto-Gear is standard and universal, readily mounted on Crane iron and steel gate valves in sizes from 6-inch to 36-inch, in outside screw and yoke or non-rising stem patterns.

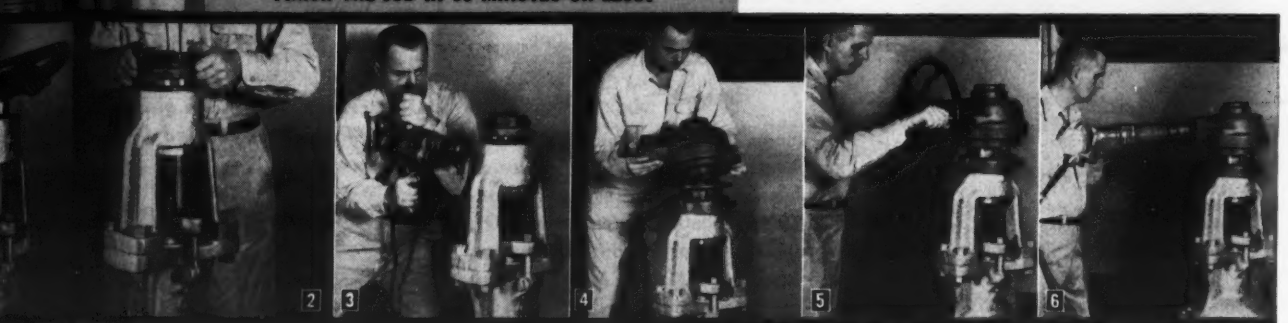
And new orders for gear operated valves can be filled with unprecedented speed because the Converto-Gear can be supplied on valves right from stock. No special yoke castings or brackets are needed . . . just the basic gear operator and a simple two-piece adapter.

CRANE®

CRANE CO., INDUSTRIAL PRODUCTS GROUP
4100 S. KEDZIE AVE., CHICAGO 32

VALVES • ELECTRONIC CONTROLS • PIPING
PLUMBING • HEATING • AIR CONDITIONING
HEAT EXCHANGERS • CYCLOTHERM® BOILERS

FINISH THE JOB IN 30 MINUTES OR LESS!



To convert your OS & Y valve, (1) remove the handwheel, (2) mount the yoke sleeve adapter, (3) countersink 4 holes for the Converto-Gear adapter, (4) bolt the adapter in place and attach your Crane Converto-Gear Operator, (5) and you're ready for smooth, manual operation, (6) or fast operation with an air or electric power operator.

Check 4574 opposite last page.

jeeping the pipe. Required coating thickness is 10 mill.

Field experience has shown that the coated pipe can be handled in much the same manner as bare pipe. Welding of sections can also be accomplished through the resin coating.

In salt crock tests, resistance of coating remained at constantly high level during two year period of immersion under both anodic and cathodic conditions. Typical resistance value of 10 mil coating is 10,000 megohms per sq ft.

Pipe is initially being produced in sizes up to two inches. The resin may also be applied to fittings, brackets and other objects.

(Further information about Skotchkote resin 101 may be obtained from Minnesota Mining and Manufacturing Co., 900 Bush Avenue, St. Paul 6, Minn.)

Check 4575 opposite last page.

Pressure-sensitive, two-side primed Teflon tape

Pressure-sensitive Teflon tape is now available for high temperature applications. The corrosion-resistant tape utilizes a silicon polymer adhesive and skived Teflon film backing to which a special primed surface is applied. Total thickness of tape is 0.006".

Tape is recommended for electrical applications where dielectric strength, low power factor and negligible moisture absorption is important. Product meets class-H insulation requirements.

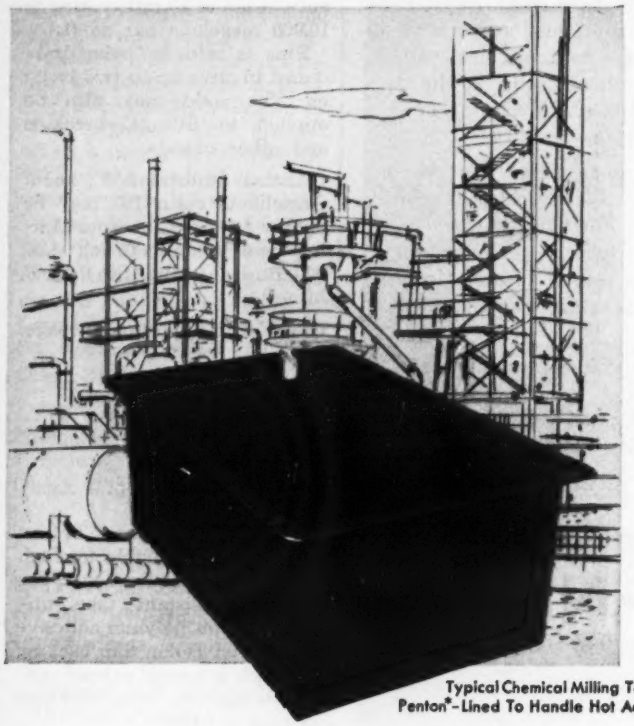
Tape can be marked with almost any commercially available ink. Since tape is white, marks show up visibly clear. Product is available in 18 yard rolls having ½ to 1" widths. Small width roll costs $8.00.

(Further information about Temp-R-Tape TSP may be obtained from The Connecticut Hard Rubber Company, 407 East Street, New Haven, Connecticut.)

Check 4576 opposite last page.

GAR-LINE PENTON TANK LININGS

for Corrosion Resistant Service



Typical Chemical Milling Tank Penton*-Lined To Handle Hot Acids

New GAR-LINE Penton Tank Linings offer economical, high-temperature protection against corrosion. Where only more expensive materials were previously used, GAR-LINE Penton Tank Linings are proving their ability to perform as well as—and better—in many corrosive exposures at high temperatures.

Unique Properties. Mechanically, GAR-LINE Penton Tank Linings exhibit excellent tensile strength at high temperatures, good dimensional stability and low water absorption . . . Chemically, they resist all inorganic acids except fuming nitric and fuming sulfuric.

Applied by carefully selected and authorized applicators. The experience of these tank lining experts guarantees satisfactory GAR-LINE Penton installation, prevents expensive failure due to improper application. Approved applicators include:

ABRASION & CORROSION ENGRS.
1205 N. McMasters Street
Amarillo, Texas

AUTOMOTIVE RUBBER CO., INC.
12580 Beech Road
Detroit 39, Michigan

BARTHEL CHEMICAL CONST., CO., INC.
P.O. Box 1025
Tacoma 1, Washington

BELKE MFG. CO., INC.
947 N. Cicero Avenue
Chicago 51, Illinois

BITTNER INDUSTRIES, INC.
91 Diaz St.
P.O. Box 10265
Prichard, Alabama

BUCKLEY IRON WORKS
21 Christopher Street
Dorchester, Mass.

BUFFALO LININGS
73 Gillette Avenue
Buffalo 14, New York

CHEMICAL PROOF OF SEATTLE
625 Alaska Street
Seattle, Washington

ELCHEM ENGRG. & MFG. LTD.
2025 James Street
Burlington, Ontario, Canada

ELECTRO CHEMICAL ENGRG. & MFG. CO.
750 Broad Street
Emmaus, Pennsylvania

THE FORTUNE COMPANY
1906 N. Mosley
Wichita 14, Kansas

GOODALL RUBBER COMPANY
2050 N. Hawthorne Avenue
Melrose Park, Illinois

HANSZEN PLASTICS COMPANY
835 S. Good-Latimer Expressway
Dallas, Texas

INNER-TANK LINING CORP.
4777 Eastern Avenue
Cincinnati 26, Ohio

MAURICE A. KNIGHT
Kelly Avenue
Akron 9, Ohio

MERCER RUBBER CORPORATION
Highway 46, Cor. Huyler
Little Ferry, N. J.

METALWELD, INC.
Scotts Lane & Abbottsford Rd.
Philadelphia 29, Pa.

PARKER BROTHERS, INC.
7044 Bandini Blvd.
Los Angeles 22, California

PLASTIC APPLICATORS INC.
7020 Katy Rd.
P.O. Box 7631
Houston 7, Texas

RUBBER MILLERS, INC.
707 S. Caton Avenue
Baltimore, Maryland

ST. LOUIS METALLIZING CO.
625 S. Sarah Street
St. Louis 10, Missouri

STEBBINS ENGRG. & MFG. CO.
Watertown, New York

GARLOCK

Investigate GAR-LINE Penton Tank Linings as the answer to your corrosion problems. For more information, contact the applicator nearest to you. Or, write for data on Penton; information also available on Teflon Anti-Stick and Teflon† Tank Linings. Special Products Dept., Garlock Inc., P.O. Box 612, Camden 1, New Jersey.

*Registered Trademark, Hercules Powder Company
†Registered Trademark, The DuPont Company

Check 4577 opposite last page.

Solid vinyl fan delivers up to 25,000 cfm

Solid vinyl, belt-driven tubeaxial fans are suitable for use in highly corrosive air handling applications. They



Vinyl fan has stainless steel shaft

are available in sizes from 16 to 36", with air deliveries to 25,000 cfm.

Entire fan drum assembly — including mounting flanges, bearing support, motor support and belt tube — is fabricated of solid vinyl, welded air-tight. Bearing assembly, coated with polyvinyl chloride, incorporates a stainless steel shaft with a labyrinth flinger that keeps corrosive condensate out of bearings. Airfoil section propeller may be either polyvinyl chloride coated or 347 stainless steel.

(Vinyl tubeaxial fan is product of Propellair Div., Robbins & Myers, Inc., Springfield, Ohio.)

Check 4578 opposite last page.

No scratch, just more gloss — when coin is rubbed over coating

Zinc-silicate product looks like galvanized finish

Uses: Battling corrosion in tanks, pipelines, valves and other exposed metal surfaces.

Features: Inorganic zinc-silicate coating is so hard that a coin rubbed across surface only adds polish, not scratches.

Description: Product pro-

vides high protection against corrosion. Weight is approximately 30 lb per gal. In appearance it is gray, resembling galvanization.

Coating comes in three separate cans. First, zinc dust from one and the vehicle from another are mixed and sprayed on surface. After one to two hours, curing solution is applied to the coating. Surface becomes hard as soon as solution dries.

Coating must be applied under conditions less than 85% relative humidity and temperature above freezing. Coating under two mills thick changes color and must be removed and applied again. Layer thicker than four mills results in "mud cracking" effect.

(Further information about Rust-Ban 190 may be obtained from Humble Division, Humble Oil & Refining Company, P. O. Box 2180, Houston 1, Texas)

Check 4579 opposite last page.

NEW LITERATURE
Corrosion Control

Oil-soluble corrosion inhibitor for ferrous surfaces is described in five-page technical bulletin. Characteristics, specifications and recommended applications are summarized. Bul Atpet 200 — Atlas Powder Company.

Check 4580 opposite last page.

Latest information about beryllium tube is covered in four-page technical data sheet. Physical and mechanical properties and composition limits of product from which tube is made are listed. Disadvantages are also mentioned. Health physics aspects are discussed. Data memorandum No. 26 — Superior Tube Company.

Check 4581 opposite last page.

Impervious graphite diaphragm valves are discussed in six-page catalog. Photographs, engineering drawings and dimensions of valves are included. Units resist thermal shock and temperatures up to 340°F at 50 psi. Bul 1610 — Falls Industries, Inc.

Check 4582 opposite last page.



HANDLES 32% HCl AT AMBIENT TEMPERATURES—Workman is painting a section of Fibercast Pipe bearing 32% HCl at a Shell chemical plant. Note that Fibercast has sufficient strength for installation on span racks with the spacing normally used for metal pipe.

New pipes handle temperatures and pressures where no other pipes will do



WHAT is Fibercast?

It is a centrifugally cast, thermoset, epoxy resin reinforced pipe that handles temperature and pressure problems where no other non-metallic pipe will do. Its body of woven glass fibers resists high tension forces, is imbedded and bonded by heat in epoxy resin. Result: strong, long-lasting pipe that resists high pressure and temperatures in corrosive environments.

WHERE should Fibercast be used?

The petroleum industry . . . chemical . . . petro-chemical . . . nuclear energy . . . textile . . . paper . . . and food-processing industries . . . countless operations handling acids, alkalies, salt water and other corrosive liquids under pressure.

Wherever ease of handling, lightweight, dielectric properties and structural stability are desirable in a material that is at the same time outstandingly resistant to heat, pressure and corrosion.

WHY use Fibercast?

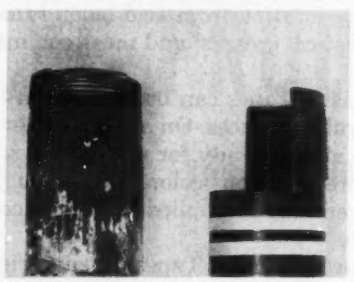
Because its advantages of superior resistance to heat, pressure and corrosion give Fibercast long service life that would alone justify choosing it over other materials.

Because even more expensive metal pipe or pipe with thermoplastic interior coatings cannot match Fibercast's proven durability.

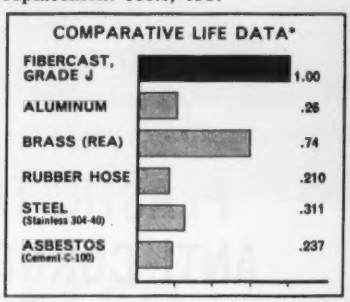
Because case histories and accurate testing have proved over and over again that Fibercast performs better, lasts longer, costs less.

Because out of 338 common corrosive solutions, Fibercast competently handles 320.

And, naturally, because Fibercast's unique and lasting qualities under such conditions mean that it drastically reduces maintenance and replacement costs, too.



Fibercast Tubing (right) used to suspend a 1,200 lb. pump for 3 years in a salt water supply well. *There was no loss in strength.* The damaged plastic-coated steel nipple (left) was used in the same installation, failed after 3 months service.



*Basing Fibercast as unit life of 1 and others as comparative percentages thereof.

Remember, also, that the three major systems of joining all pipe are used with equal success on Fibercast (standard flanged, cemented, and threaded and coupled), and with a complete selection of Fibercast Fittings. It's the world's largest line of corrosion-resistant epoxy pipefittings!

To receive a free sample of Fibercast, to learn more of the details, and to get specific information about how Fibercast can help *you*, mail the coupon below.

FIBERCAST COMPANY CP-90
Box 727, Sand Springs, Okla.

Please send me further information about Fibercast Tube and Pipe.

Name _____

Title _____

Firm _____

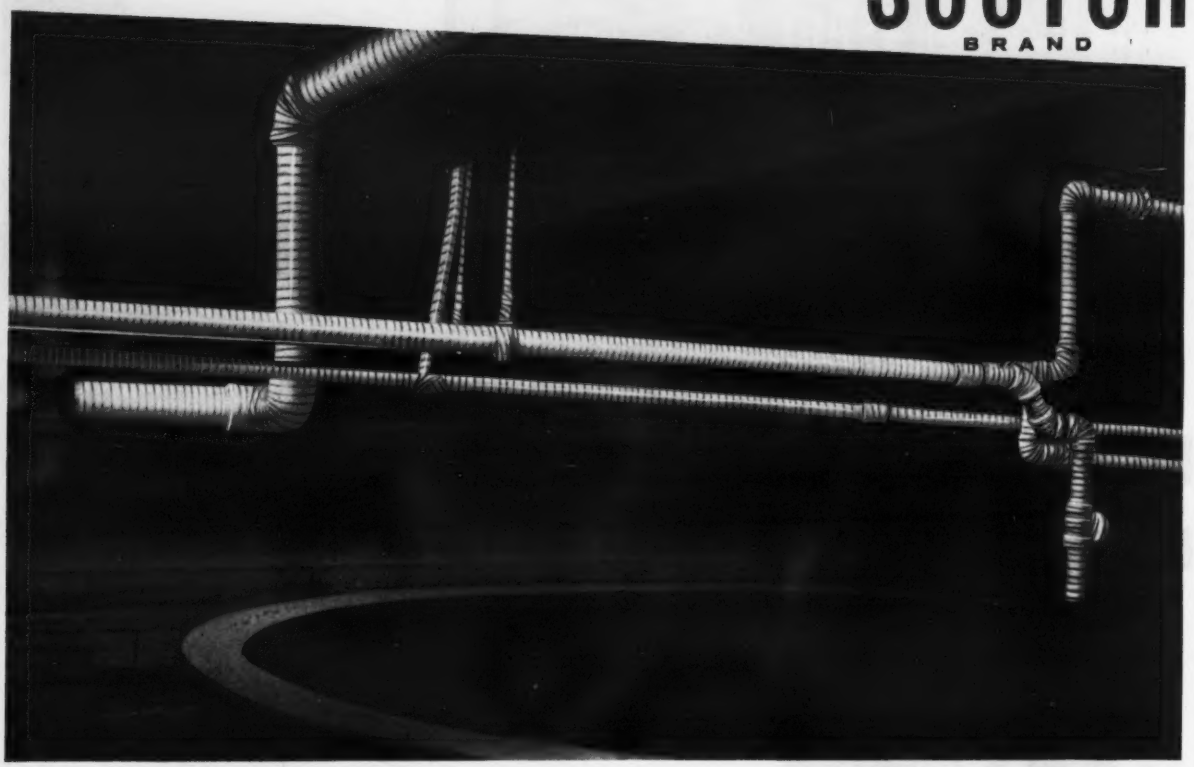
Type of Business _____

Address _____

City _____ Zone _____ State _____

FIBERCAST® COMPANY — A DIVISION OF **Youngstown** SHEET AND TUBE COMPANY

Check 4583 opposite last page.



TAPEnology... industry's newest cost-cutting tool

PLASTIC TAPE GIVES PIPES ANTI-CORROSION PROTECTION

Now you can stop pipe network corrosion before it starts . . . fast, too, with wrappings of pressure-sensitive "SCOTCH" BRAND Plastic Tapes. Tape provides an air-tight moisture-vapor barrier that guards against corrosion or deterioration from acid laden fumes; is also resistant to oil, water, caustics, greases, and most commercial solvents.

Easy to apply "SCOTCH" Plastic Tapes can be *s-t-r-e-t-c-h-e-d* to conform to odd shaped or irregular surfaces. On at a touch, even in hard to reach places, they are always ready for use and no special application equipment is required. Various colored backings give a bright "finished" look wherever they're applied; different colored bands permit color coding, too.

The complete line of "SCOTCH" Plastic Tapes—in a variety of thicknesses, widths and lengths—is readily available from your nearest "SCOTCH" BRAND Tape Distributor. Call him today, or write: 3M Co., 900 Bush Ave., St. Paul 6, Minn.

When tape costs so little, why take less than "SCOTCH" Brand?

"SCOTCH" IS A REGISTERED TRADEMARK OF 3M CO., ST. PAUL 6, MINN.
EXPORT: 99 PARK AVE., NEW YORK 16. CANADA: LONDON, ONTARIO

MINNESOTA MINING AND MANUFACTURING COMPANY
...WHERE RESEARCH IS THE KEY TO TOMORROW

SCOTCH BRAND
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Check 4584 opposite last page.

CORROSION CONTROL

Stainless steel and high-alloy castings for corrosive and high temperature applications are discussed in 64-page booklet. Headings include how to select proper casting alloy, high-temperature mechanical properties, heat-resistant alloy casting design, corrosive attack, groups of corrosion-resistant alloy castings, corrosion data, machining and welding. Many tables of technical information are included. Booklet also contains photographs and information on applications in 24 industries. "Heat and Corrosion Resistant Castings" — International Nickel Company, Inc.

Check 4585 opposite last page.

Use of sodium silicate for guarding water systems against corrosion is topic of two-page technical information sheet. List of metals that can be protected is included. Applications not specifically related to water lines are also covered. Bul T-37-3 — Philadelphia Quartz Company.

Check 4586 opposite last page.

Large polyolefin moldings are discussed in four-page bulletin. Products possess high chemical and wear resistance properties as well as great impact strength. Maximum rod dimension is 16" diam by 80" long. Block is 6 x 12 x 24". Bul "Polyolefin Moldings" — American Agile Corporation.

Check 4587 opposite last page.

Results of years of research on high alloy castings are summarized in 12-page booklet, which lists 46 important technical papers, articles, reprints and data sheets about heat- and corrosion-resistant alloys that have been published. Technical Publications List — Alloy Casting Institute.

Check 4588 opposite last page.

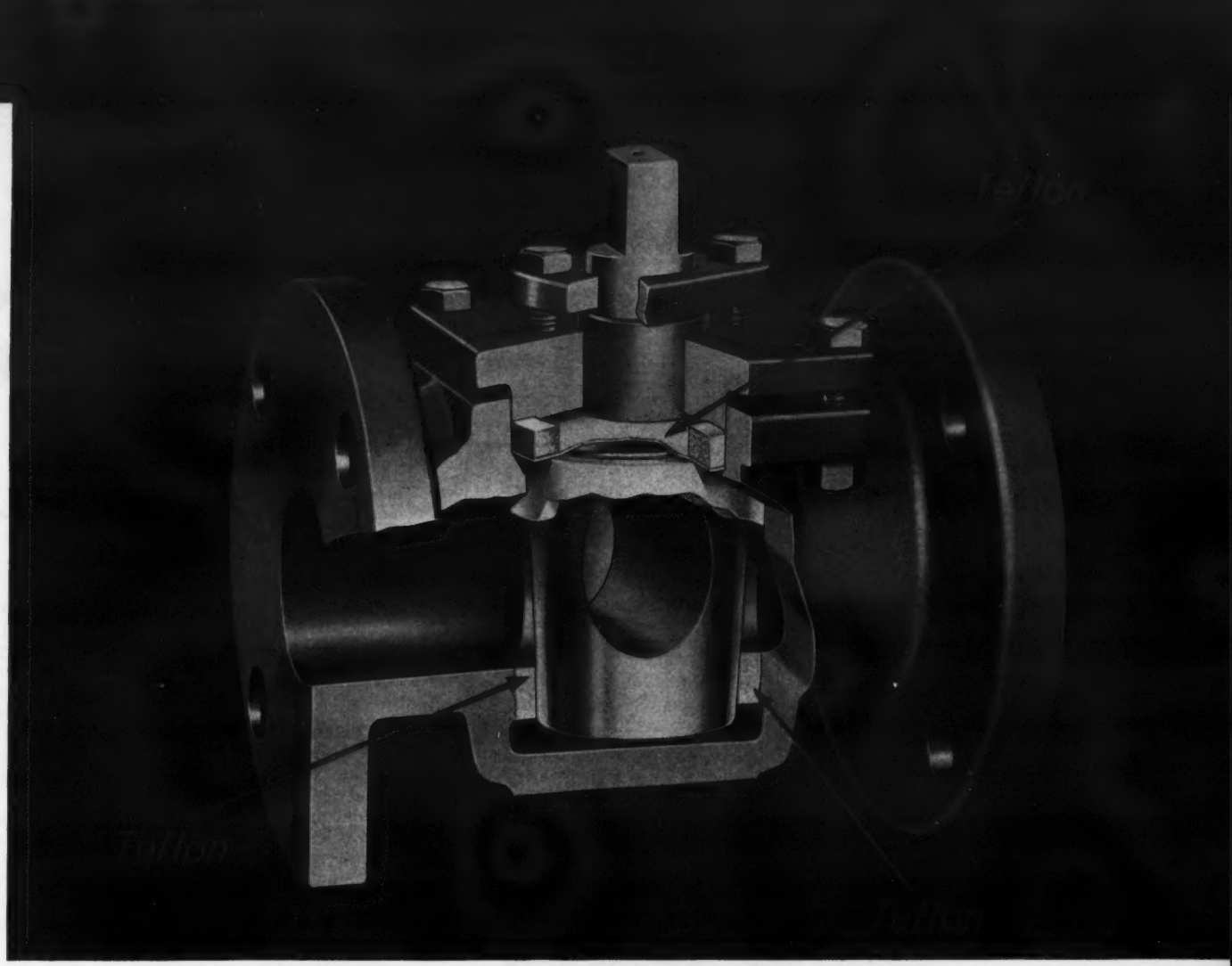
How to protect boiler water from scale and corrosion is discussed in six-page folder. Water Treatment Folder — E. W. Smith Chemical Co.

Check 4589 opposite last page.

Industrial ventilating equipment for corrosive atmospheres are subject of four-page, illustrated booklet. Materials and coatings which can be used to offset effects of acid, alkalies and other commonly encountered corrosive elements are described. "Industrial Ventilating Equipment" — Hartzell Propeller Fan Company.

Check 4590 opposite last page.

Welding of titanium and titanium alloys — including use of inert gas-shielded metal-arc welding — are reported in 69-page document. PB 151079 — OTS, U. S. Department of Commerce, Washington 25, D. C. Remit $1.75.



THROW OUT LUBRICATED PLUG-VALVE PROBLEMS

Install non-lubricated DURCO Type G Sleeveline valves

Wherever you have cast iron or semi-steel valves that stick, gall, break, leak thru, or otherwise cause maintenance nightmares, install ductile iron Durco Type G valves with Teflon sleeves.

Durco Sleeveline valves are available in ductile iron or stainless steel, screwed or flanged ends, from ½" through 6", with 150 psi rating.

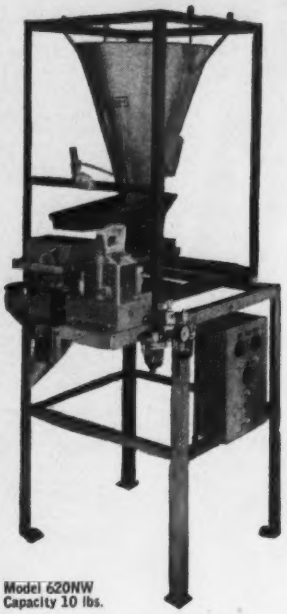
Write today for your copy of Bulletin V/12.

DURCO
CORROSION RESISTING ALLOYS & EQUIPMENT

For more information on product at right, specify 4591 see information request blank opposite last page.

THE DURIRON COMPANY, INC., Dayton, Ohio / Valves • Pumps • Filters • Process Equipment

EXACT WEIGHT® Automatic Net Weighing Machines



Model 620NW
Capacity 10 lbs.

FOR PACKAGING, BAGGING, BATCHING, COMPOUNDING

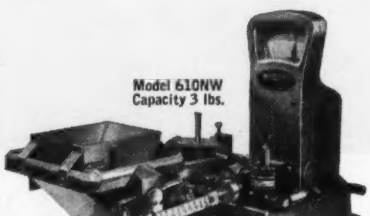
Exact Weight offers:

- Precision industrial-type scale.
- Over-under indicator visual check eliminates need for separate checkweighing operation.
- Calibrated adjustments with counterweights of known value; graduated beam, poise and scale indicator.
- Design backed by 45 years of experience in specialized weighing equipment.
- Readily accessible service and maintenance facilities.
- Performance guaranteed in writing.

Weighs and feeds any dry, free-flowing materials . . . fast and accurate operation . . . helps cut production costs. Write for Bulletin 3318 for details and specifications.

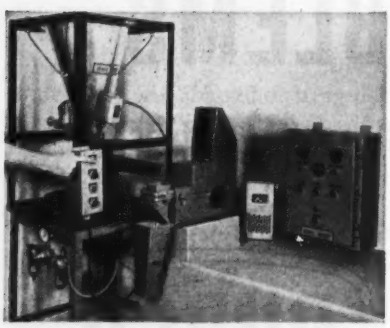
Automatic Net Weigher

Net Weigher can be supplied without the feeder machine, support frame and discharge chute. The unit may be adaptable to your specific operation. Write for Bulletin 3311.



Model 610NW
Capacity 3 lbs.

Precision Automatic Net Weighing Machine



Model 4601 NW, left, for weighing dry products with accuracies of 1/10 gram on quantities below 10 grams and one percent accuracy on quantities of 10 grams and above. Combines a high-accuracy Shadograph Scale, air-operated dump mechanism, hoppers, vibratory feeders and photoelectric controls. Models with capacities from 50 grams to 500 grams. Write for Bulletin 3363.

Exact Weight SCALES

THE EXACT WEIGHT SCALE CO.
905 W. FIFTH AVE., COLUMBUS 8, OHIO
In Canada: 5 Six Points Road, Toronto 18, Ont.

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Sales and Service Coast to Coast

BETTER QUALITY CONTROL . . . BETTER COST CONTROL

Check 4592 opposite last page.

Dust-tight Handlin Averts Communit

Speeds ore-car unloading, cuts losses, improves plant working conditions

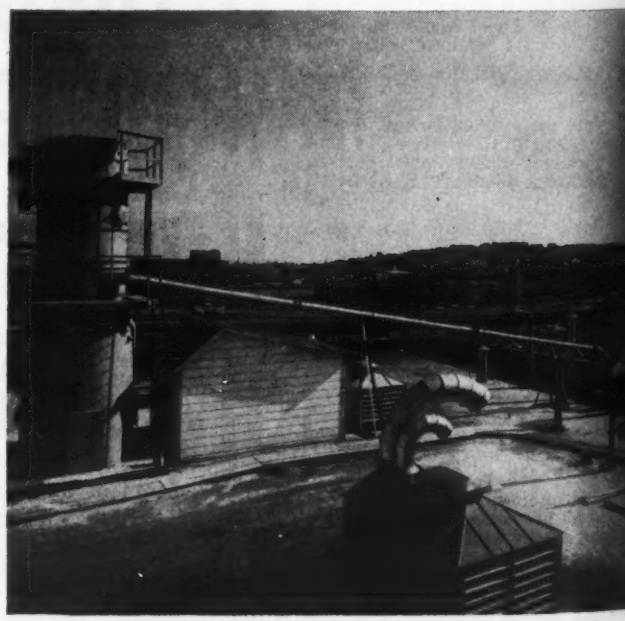
E. S. HAYS, Plant Manager
Utah Street Plant
Stauffer Chemical Co.
San Francisco, California

PROBLEM: Borax-ore dust from boxcar-unloading operations threatened to become a serious community-relations problem as city expansion brought residences closer and closer to the Utah Street Plant of Stauffer Chemical Co., San Francisco. Highly alkaline, the ore can have an adverse effect on house and automobile paints.

The open system — truck-mounted scoop to screw conveyor, to bucket elevator, storage bin — also lost mat rial. And men working clo to the system had to use ca because the dust is a nasa membrane irritant.

Solution: Handling is no done with a pneumatic co veyor system which takes t ore from under hopper ca (instead of previous boxcar to storage, via an enclos dust-tight network.

The ore, a sluggishly flow ing, slightly abrasive cruc form of borax called rasonit or kernite, is vibrated fro hopper bottoms of railro car. Two 5" flexible met hoses pick up the ore and tak it to the ends of two length



Filter-separator of Stauffer's pneumatic conveying system is at left. It receives ore through line emerging from roof at right

System -relations Threat

of 5″ steel conveying ducts projecting from side of plant.

These ducts join immediately inside the building into one 8″ Schedule 40 pipe which carries the material up along the interior wall for 60′. Here the line emerges onto roof, where it is connected to cyclone separator-filter of the pneumatic system. From this unit the ore drops into the storage bin — a closed rectangular room holding 20,000 tons in the basement.

Diverting valves give considerable built-in flexibility. They can be set to deliver either directly to storage or to a 20,000-lb process weigh-hopper. A special "overflow" arrangement also permits **simultaneous** delivery to **both**.

In addition, the same system is used to reclaim, when necessary, from storage to process weigh-hopper. Reclaiming system incorporates a number of ore pickup nozzles in tunnel network beneath ore storage room. Employees don't have to enter the room, but merely open the desired reclaiming valve in dust-free tunnels.

Results: Enclosed system has eliminated air pollution problems and markedly improved working conditions. Material loss is at a minimum.

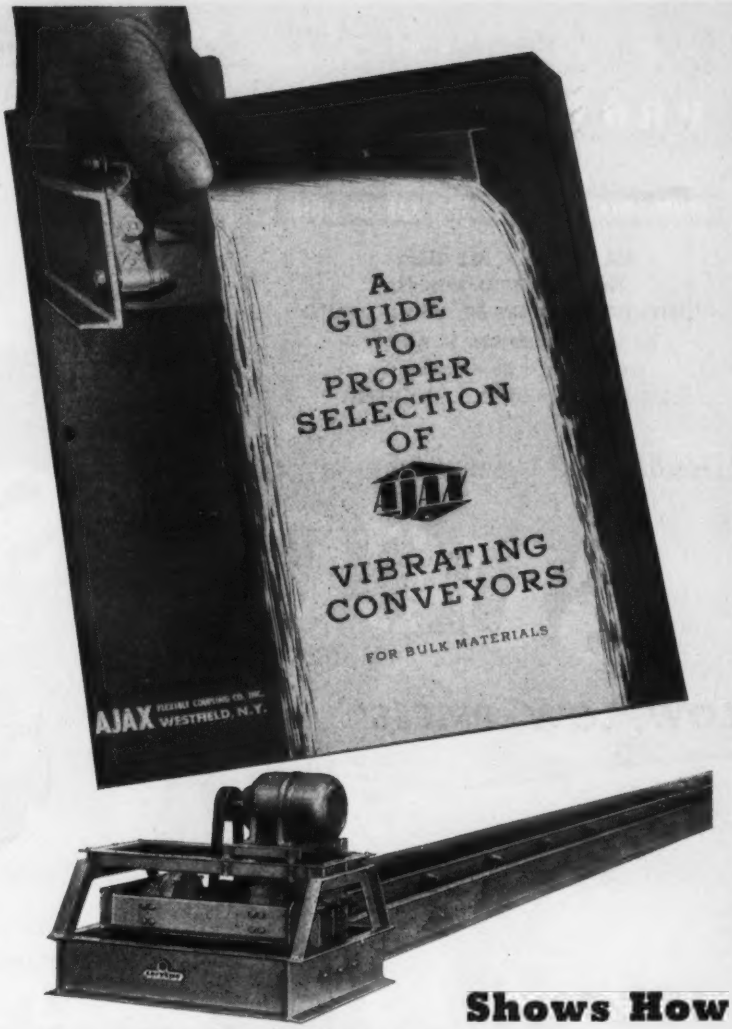
Unloading is done more rapidly, with less manpower. One man unloads full 60-ton-capacity hopper car in four hours. And with the plant receiving eight to ten carloads a week, these savings become a definite plus factor.

(Airveyor pneumatic conveying system was supplied by Fuller Co., Catasauqua, Pa.)

Check 4593 opposite last page.



Ore is sucked into conveyor through two flexible metal lines, joined into one line inside, which leads to filter-separator on roof



Shows How to do TWO OR MORE JOBS for the Price of ONE MACHINE

You will find new ideas on how vibration cuts costs of conveying and processing.

Ajax Lo-Veyors take advantage of vibration to perform many unusual, difficult and costly operations at impressive savings.

You are invited to take advantage of the broad experience of Ajax Vibration Engineers as an aid to you in working out the answer to some tricky requirements. As a start, write for Ajax Selection Guide No. 66.

for

Cooling
Washing
De-Watering
Drying
Sorting
Aligning
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Feeding
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AJAX

AJAX FLEXIBLE COUPLING CO. INC.
24 Portage Road, Westfield, N. Y.

In Canada—The Alexander Fleck, Ltd., Ottawa

Please send Ajax Lo-Veyor Selection Guide to

Name_____

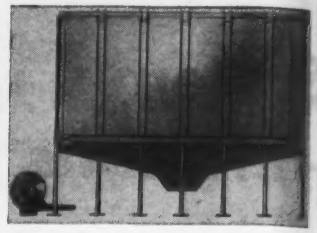
Concern_____

Address_____

Check 4594 opposite last page.

PROTECTIVE'S
DOUBLE-SEALS
DRUM LINERS ★ BAGS ★ CARTON LINERS
SUCCESS!
"TWIN-SURE" DOUBLE-SEAL
"DOUBLE WELD" POWER SEAL
DOUBLE-SEAL Round & Straight
PROTECTIVE LINING CORPORATION
GENERAL OFFICES AND PLANT 22 WOODHULL STREET, BROOKLYN 31, NEW YORK

Check 4595 opposite last page.



Fluidized discharging

. . . is feature of bulk materials modular bin with glass-fused-steel interior surface. Unit accommodates bulk materials that can be highly fluidized by aeration.

Entire floor area of bin, consisting of aeration media, is inclined 12½° toward the discharge opening.

Unit is currently available in sizes 9 x 9 x 18' long.

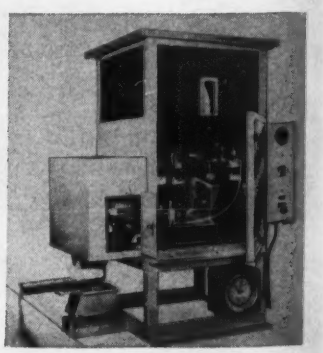
(Permaglas modular bin is product of Permaglas Division, A. O. Smith Corporation, Kankakee, Illinois.)

Check 4596 opposite last page.

Dry additives inserted accurately into processing line

Uses: High-precision continuous weighing of loose, free-flowing granular solids.

Features: Inserts exacting quantities of dry additives into processing lines operated by conveyor, pipeline or other



Provides continuous, accurate weighing of additives for processing lines

continuous flow methods. Machine handles wide variety of products in quantities from 1 oz to 3 lb and 3 to 10 lb.

Description: When unit is

placed over a product stream, a precision scale, with over-and-under indicator, weighs precise amounts of additive in a net weigh hopper. Air-operated mechanism then dumps additive into small, secondary hopper which, in turn, feeds additive into vibratory feeder. From feeder additive is introduced into processing line in uniform, even flow.

Multiple units of two or more machines may be combined to increase number of weighments per minute or machines may be electrically synchronized with discharge chutes designed to deliver product through single spout.

(Continuous weighing system is development of The Exact Weight Scale Company, 538 E. Town St., Columbus 15, Ohio.)

Check 4597 opposite last page.

End-of-line rejections

. . . of filled containers because of imperfections and damage on conveyorized lines can be prevented or reduced with container-testing device.

Tester is mounted on intake side of conveyor over existing chain. Vacuum member lifts perfect bottles (air-tight) over gap in conveyor and discharges them on other side for entry into filler. Imperfect containers drop through conveyor gap.

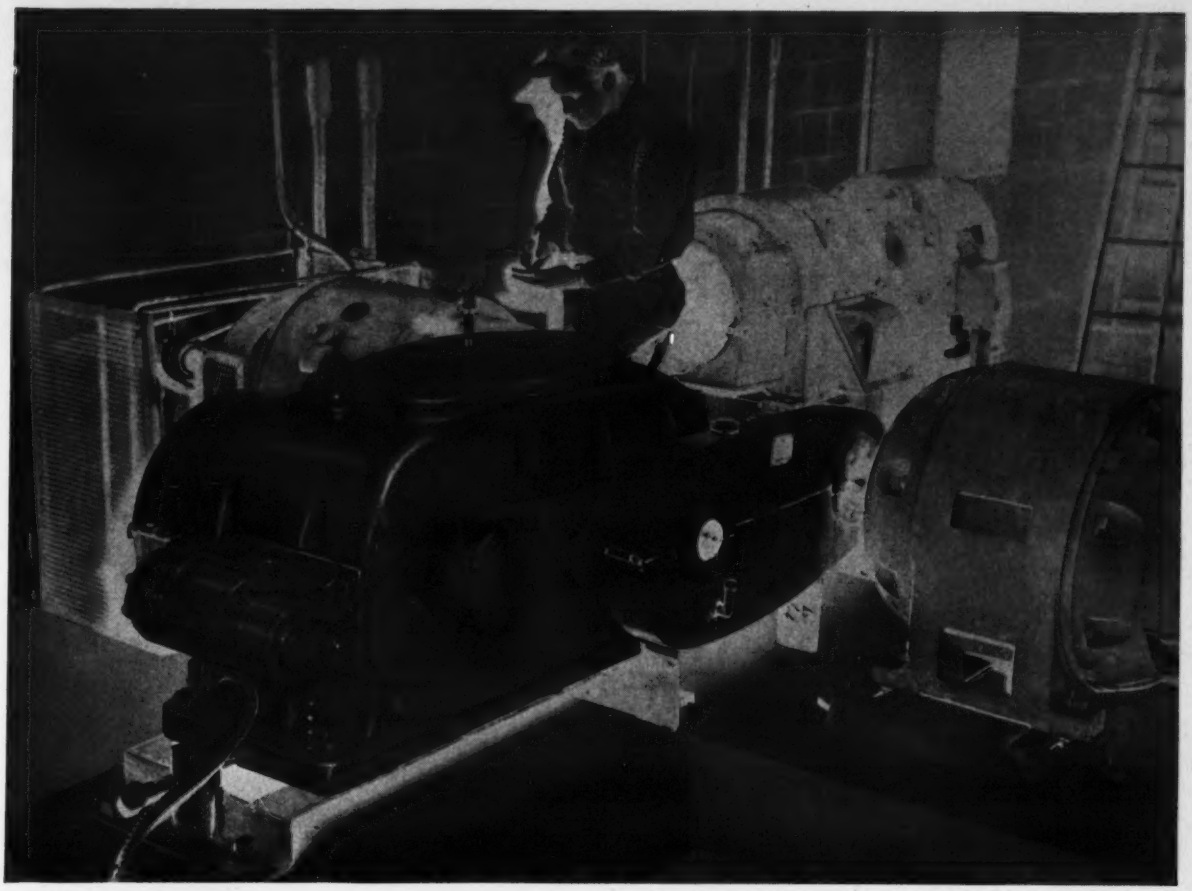
Tester operates with glass, metal or plastic containers ranging in size from ½ oz through 8 oz at speeds up to 300 per min.

(Container testing device is development of MRM Company, Inc., Brooklyn, N.Y., 191 Berry St.)

Check 4598 opposite last page.

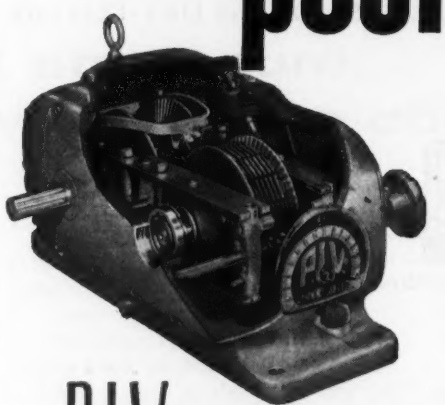
NEXT MONTH

Improved efficiency with reciprocal lower costs is the result of switching to automatic wax packaging and palletizing at Atlantic Refinery Company's Point Breeze plant. The complete story wil be featured in October CP.



For stepless, slipless, accurate, infinitely variable speed control:

positive P.I.V. VARIABLE SPEED DRIVES



P.I.V. LINK-BELT VARIABLE SPEED DRIVES

UNIQUE in operation, unmatched in accuracy! That's Link-Belt P.I.V.—the *only* chain-driven variable speed drive. Teeth—not tension—permit instant ratio changes with no loss of efficiency, regardless of load conditions.

P.I.V.'s exclusive all-metal, self-tooth-forming chain consists of packs of free-sliding steel slats which serve as teeth. The chain meshes with radially grooved wheels cut to a constant depth toward the wheel periphery. Beveled sides of the grooves offer gripping areas . . . provide a positive, nonslip contact at any speed, under all loads.

Link-Belt P.I.V. drives are available in 8 sizes and 16 standard types, in capacities from ½ to 25 hp—horizontal or vertical housings. Type RS P.I.V. variable speed drive is available in capacities up to 50 hp.

Book 2274 contains the complete P.I.V. story. For your copy, contact your nearest Link-Belt district sales office or authorized stock-carrying distributor. Refer to the yellow pages of your phone directory under Power Transmission Equipment.

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Warehouses, District Sales Offices and Stock Carrying Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World. 15.360

Check 4599 opposite last page.

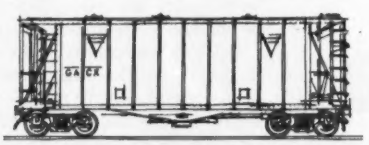
Let Our Tests Prove That Bulk Shipping Via AIRSLIDE® and DRY-FLO® Cars is Right For Your Product

When General American "okays" a product for shipment in AIRSLIDE and DRY-FLO cars, you know that you are getting the best and most economical method of bulk transportation. In its laboratories, General American investigates the flow properties of dry, powdered and granular materials, then if further assurance is necessary, test cars are available for checking performance under actual railroad conditions.

The first time you use these cars, experts are at your service to supervise the initial unloading and show your men the techniques for quick and efficient operation.

As a further service, General American maintains shops throughout the country, staffed by skilled technicians to ensure maximum "in-service" mileage for your AIRSLIDE and DRY-FLO cars.

It pays to plan with General American.



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AIRSLIDE GENERAL AMERICAN TRADE MARK

GENERAL AMERICAN TRANSPORTATION CORPORATION

135 South LaSalle Street • Chicago 3, Illinois
Offices in principal cities
In Canada: Canadian General Transit Co., Ltd., Montreal

Check 4600 opposite last page.

Self-cleaning ramps

. . . have heavy-duty, all-grating surface designed to eliminate build-up of snow, ice, mud, oil or grease and provide safe, all-weather surface.

Made of lightweight magnesium for one-man handling, they are available in 58 and 78″ widths, and 30 and 36′ lengths. Capacities range from 7000 to 20,000 lb. Ramps are mounted on 18″ pneumatic-tired wheels for mobility.

(Mobile loading ramps are manufactured by Magline Inc., 1900 Mercer St., Pinconning, Mich.)

Check 4601 opposite last page.

Machine straps packages automatically with rayon

Uses: Automatically applies, tensions and seals rayon strap on varying size packages.

Features: First strapping machine for applying rayon strap. Automatically adjust to packages ranging from 6 x 2 x 8″ to 18 x 36″ by any length.

Description: Machine binds up to 15 packages a minute with 3/16-inch-wide rayon strap. Tying tension can be varied to strap compressible bundles or rigid corrugated cartons.

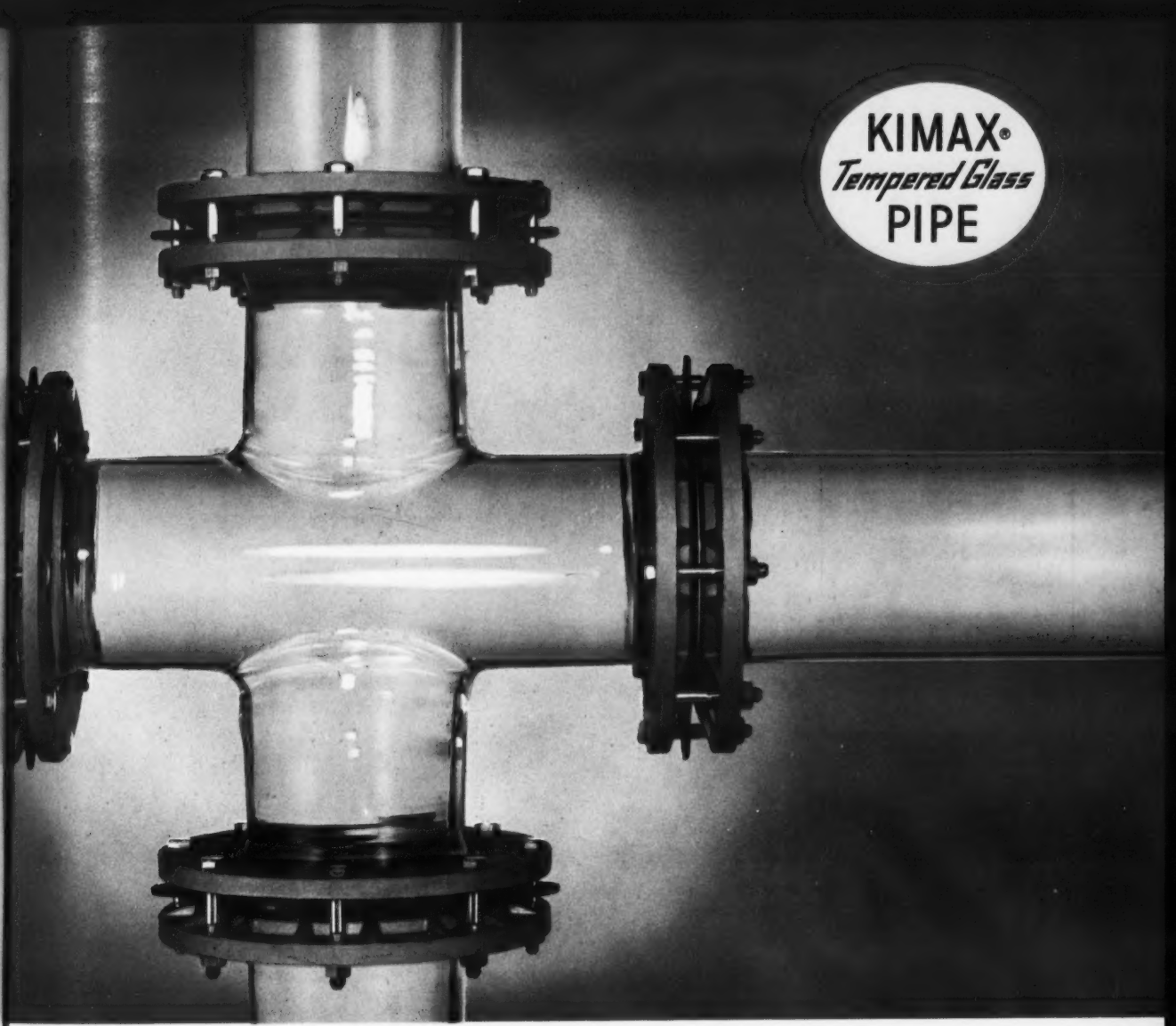
Once tying tension has been set, packages are strapped on assembly line basis. Magazine on unit holds 5000 blanks for steel seals. Strap is dispensed from 5000-yd spool.

Measuring 30 x 62 x 69″, binder is mounted on wheels. It operates on 110 v single phase AC and compressed air supply of 80 to 100 psi.

(Model 3201-18 Autobinder and Stur-D-Strap are being marketed by Fiber Straps, Inc., joint venture corporation of Chicago Printed String Company, Chicago, and A. J. Gerrard & Co., 400 E. Touhy Ave., Desplaines, Ill.)

Check 4602 opposite last page.

For more information on product at right, specify 4603 . . . see information request blank opposite last page.



Your product stays pure... because KIMAX resists corrosion!

Do your present process pipe lines guarantee the purity of your product? If not, consider KIMAX Tempered Glass Pipe.

It resists corrosion and pitting — tiny particles cannot lodge. Smooth inner walls discourage build-up of scale and residue.

It has amazing resistance to impact damage and easily withstands sudden temperature differentials from steam to cool liquids.

KIMAX Glass Pipe is serenely indifferent to the savage attack of most acids and alkalis.

Since glass is inert, nothing is ever added to or taken away from your basic product.

Stoppages in the line can be spotted in seconds and remedied almost as quickly and easily.

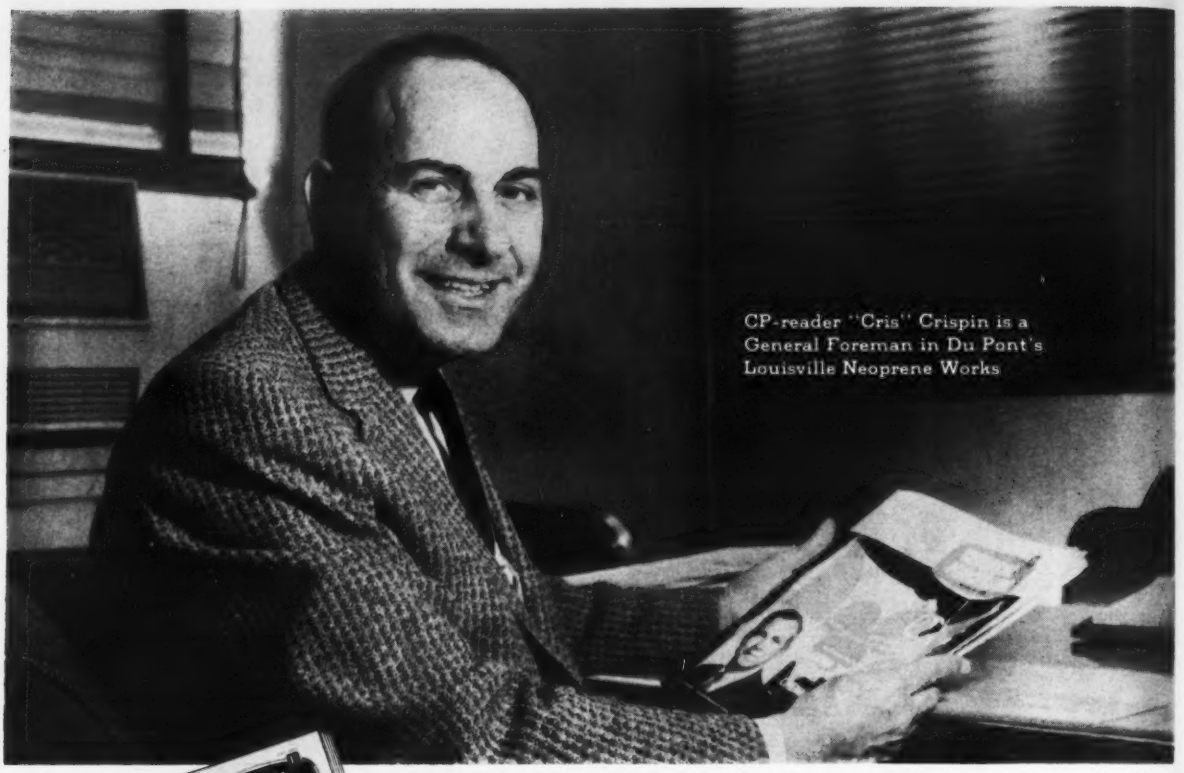
And KIMAX Glass Pipe is economical . . . initial costs compare favorably with other pipe materials. Installation cost is usually less and maintenance cost is practically nil. Replacement is infrequent.

Supplied complete with fittings and accessories for every need and interchangeable with other piping.

Distributed in the U. S. and Canada by Fischer & Porter Company, Warminster, Pa.

KIMAX TEMPERED GLASS PIPE
AN (I) PRODUCT

OWENS-ILLINOIS
GENERAL OFFICES • TOLEDO 1, OHIO



CP-reader "Cris" Crispin is a General Foreman in Du Pont's Louisville Neoprene Works



Regular Reading Habit Sparks Ideas to Keep Plant At Top Efficiency

You've got to be on your toes to be General Foreman of the CD Area (chlorobutadiene) at Du Pont's Neoprene Works in Louisville, Ky. Elwood J. Crispin has been handling this responsible position since 1950, in direct charge of 37 men and plenty of valuable, efficient, modern instrumentation and processing equipment.*

Corrosion, and ways to lick it, are always of paramount interest to "Cris" because of the chemical materials with which he has to work. But developments in instrumentation that could further "automate" his Area are also high on his list of things to keep on the lookout for.

Cris started with Du Pont in 1937, as a chemical operator in the Chambers Works. He came to the Louisville Works in 1942, when the plant started.

A shift supervisor at the Neoprene Works introduced Cris to CHEMICAL PROCESSING magazine soon after he moved to Louisville, and he's been a regular reader since. He looks for ideas and equipment developments in both advertisements and editorial material as he thumbs through each issue page by page.

Ideas sparked in this way are then discussed with the Project Engineer assigned to the Area. If further investigation appears warranted, Cris and the Engineer work close together in the study and later installation and run-in of those ideas that prove out. They're a well-balanced team, bringing together years of invaluable experience in engineering and practical plant operation.

This is another example of how regular reading of the specialized industrial magazine can do much toward keeping efficiencies up, costs down.

*Cris recently has been on leave from his CD Area duties, helping to start up a new Du Pont neoprene operation in Londonderry, Ireland. He's due back October 1st.

CHEMICAL PROCESSING

PUTMAN PUBLISHING COMPANY

Putman Publishing Building

111 East Delaware Place • Chicago 11, Illinois

EPA *"Executive Magazines For Industry"* NBP

Trailer for transporting liquid ethylene oxide approved by ICC

Unstable fluid previously shipped only by rail

Unstable ethylene oxide which has previously been exclusively carried only by special railway tank cars, can now be transported by highway in transport trailer approved by the Interstate Commerce Commission.

Transport consists of an inner shell of T-1, 115,000 psi steel completely insulated and protected by an outer shell of T-302 stainless steel. The inside or fluid carrying shell is x-rayed and stress relieved.

Overturn guards on top of transport protect special manhole cover from damage and possible leakage in event of collision. Lighting and fittings, are vapor proof.

Surface thermocouple on the tank enables driver to constantly check liquid oxide's temperature via a remote-reading dial in the truck cab.

Liquid ethylene oxide (used primarily as an intermediate for many chemicals) is colorless, has an ether-like odor and will boil at 51.3°F.

(Liquid Ethylene Oxide Trailer is manufactured by Trinity Steel Company, Inc., 4001 Irving Blvd., Dallas 12, Texas.)

Check 4604 opposite last page.



"Oh, that! Last year my company had a recession and I did a lot of worrying."

A NEW HIGH...IN VALUE
A NEW LOOK...IN STYLING
A NEW LOW ...IN PRICE

AUTOMATIC'S Gas Operated LIFT TRUCKS

VALUE PLUS—Automatic's simplified power package offers the ultimate in high operating efficiency, low cost of operation, and maximum safety. A gas engine and variable voltage generator, precisely matched, supply exact power to the electric drive motor...no clutch or hydraulic torque converter to cause trouble or worries. Here are a few of Automatic's plus value features:

- Operates on 25 to 30% less fuel
- 50% longer hydraulic pump life
- Oversize brakes last up to 30% longer and are adjustable without removing wheels
- Longer-life, advanced-design roller mounted uprights
- Ventilated exhaust dispels fumes
- New 3-way adjustable seat increases driver efficiency—reduces fatigue

MODERN STYLING—New orange and blue color combination. Automatic's new special high visibility safety orange adds another safety plus feature to your plant, while its new royal blue color accentuates the truck's low center of gravity and high stability.

THE PRICE IS RIGHT—No longer a premium-priced truck, but priced competitively with trucks which use hydraulic torque converters.



CAPACITIES: ▲
3,000 to 10,000 lbs.
with cushion tires.

CAPACITIES: ▶
3,000 to 8,000 lbs.
with pneumatic tires.



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LEARN MORE ABOUT AUTOMATIC'S COST-CUTTING LIFT TRUCKS

Please send me complete details about Automatic Gas-Operated, Electric-Driven Lift Trucks, in capacities of_____lbs._____lbs._____lbs.

NAME_____
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Check 4605 opposite last page.

HACKNEY
SEAMLESS
CYLINDERS



For safe, convenient, economical shipment of chlorine, hydrogen chloride, boron trifluoride, nitrous oxide, carbon dioxide, oxygen, nitrogen, hydrogen, helium, argon and other gases. Hackney quality features cost no more:

— Smooth, cold drawn surfaces clean easily, paint quickly.
— Controlled tare weights through deep drawing process.
— Clear stamping...embossed neck ring.
— Complete range of sizes and shapes to meet requirements of all industries.
— Central shipping location means faster service, with favorable freight charges.

Write for details.

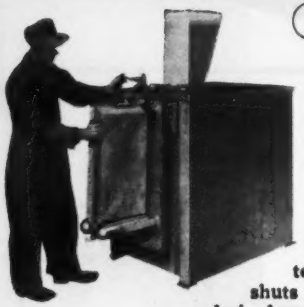
Hackney

Pressed Steel Tank Company
Manufacturer of Hackney Products
1463 South 66th Street, Milwaukee 14, Wisconsin
Branch offices in principal cities

CONTAINERS AND PRESSURE VESSELS FOR GASES, LIQUIDS AND SOLIDS

Check 4606 opposite last page.

NEW... AIRPAC METHOD
Cuts Bagging Costs!



CODDINGTON
AIRPAC
Bag Packer
FILLS AND WEIGHS

Revolutionary new compressed air method—no moving parts—packs powdery materials in valve bags . . . shuts off automatically when desired weight is reached.

Small spout on economical AIRPAC fits popular size valve in bags . . . keeps bags clean . . . eliminates costly tieing or bag closing equipment.

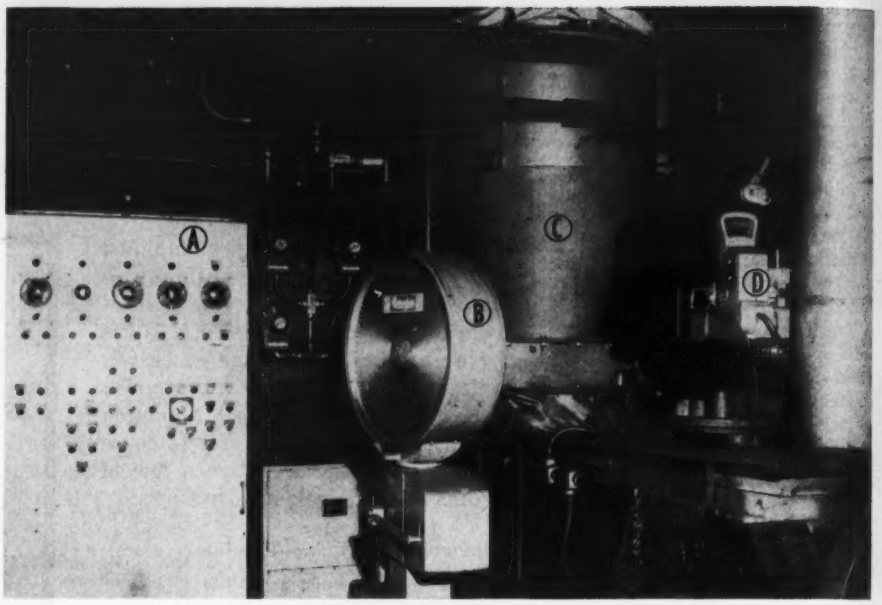
--------**FILL OUT AND MAIL TODAY**--------

E. D. CODDINGTON MFG. CO.
5036 N. 37th Street, Milwaukee 9, Wisconsin

Please send me facts on the new AIRPAC Valve Bag Packer.

MY NAME.....
COMPANY.....
ADDRESS.....
CITY.....ZONE.....STATE.....

Check 4607 opposite last page.



Key elements in automatic weighing and proportioning system at Dow Chemical Company's graphite department are control panel (A), dial head (B), scale hopper (C), and small additive scale (D)

Automatic weight control at Dow slims costs, upgrades quality

Six dry materials and one liquid proportioned, mixed and sent to extruder automatically

LABOR savings, improved quality control and formulation flexibility tip the scales in favor of automatic weighing and proportioning at Dow Chemical Company's Midland, Mich., graphite department.

System automatically proportions six dry materials and one liquid into dry mixer—empties mixture into hoist bucket when it is moved into place, and dispatches bucket to third floor. When bucket is returned to the first floor, 600-lb batch is waiting in mixer and another is ready in scale hopper. Weighing cycle requires two minutes.

On the third floor, the dry mix is heated to melt the pitch so that the particles of coke are coated with film of pitch. The mix is then cooled, dropped into the extrusion press on the first floor and extruded into 280-lb green electrodes. Electrodes are then sent to furnace to be baked for conversion into graphite.

Two scales, dial head and feeders coordinated through control panel comprise this system which has replaced semi-automatic operation with savings of one man per shift.

Major materials are fed to 1000-lb-capacity hopper scale which is mounted on levers connected to the dial head. This dial head is fitted with "weightronic" controls to regulate flow of five major ingredients in fixed sequence from their respective storage bins.

This sequence is as follows: 1) Ground green scrap—reworked material; 2) and 3) two different sizes of coarse calcined petroleum coke with screen size in range through 10 on 50 mesh; 4) coal-tar pitch; and 5) calcined petroleum coke flour, more than 50% through 200 mesh.

Coarse material is delivered to hopper by vibrating feeders while the fine pe-

troleum coke is fed with a screw feeder, 6" in diameter and 6' long. Fabricated of all mild steel, it has air-operated flush governor, electric motor drive and brake.

Dry mix, consisting of approximately 75% calcined petroleum coke and 25% coal-tar pitch plus green scrap, is emptied directly into dry mixer. As scale is emptied, a liquid additive is automatically dumped into this mix.

Also tied into this operation is a small scale, equipped with a three-cubic-foot-capacity feed hopper, which weighs and dumps powder additive in quantities varying from two to 10 lb into mixer. Discharge is simultaneous with that of large scale.

Ingredients are weighed separately for accuracy and easier blending.

For flexibility, the control panel is equipped with an In/Out selection switch which enables the operator to incorporate powder additive into formulation or cut it out, as desired.

Weighing of five major ingredients may also be controlled manually through circuit separate from automatic circuit. Manual controls consist of tap switch and push-button.

The system includes individual weight totalizers for each ingredient, and over-and-under controls, adjustable to plus-or-minus one pound on a 100-lb weighing.

(Select-O-Weigh system is development of Richardson Scale Company, Clifton, N.J.)

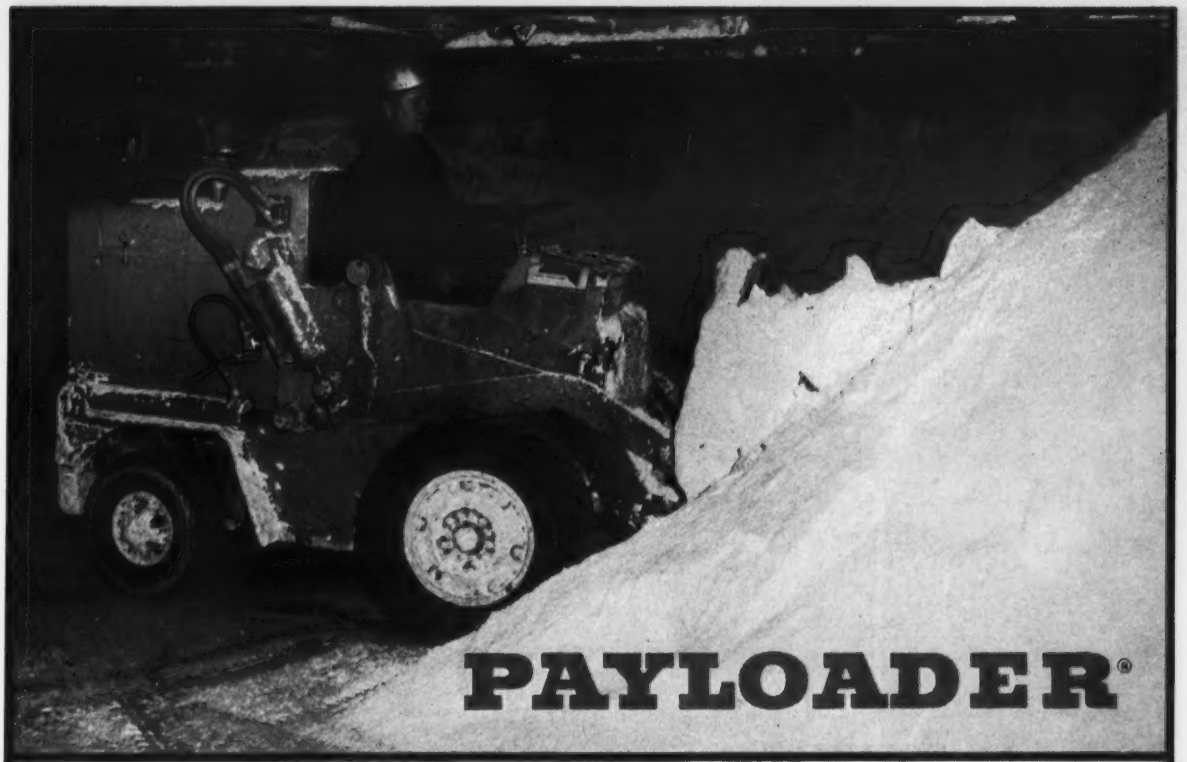
Check 4608 opposite last page.

Zinc-oxygen fuel cell seen as power source for electric trucks

Battery, truck makers join forces to adapt model

Electric trucks, versatile industrial workhorses, loom as favorites in race to provide the first commercial application of the fuel-cell principle.

When this is likely to hap-



What users say about the H-25..

The success of the H-25 "PAYLOADER" can best be gauged by what owners and operators of this tractor-shovel say about it. Here are typical comments from users in foundry, chemical, ceramic, paper, and other industries.

Power and Capacity: "Gives nearly twice the production of our old HA's . . . good digging power and traction, fast lifting power. The most efficient we've ever used — outperforming larger loaders." "Before purchasing the H-25 we had competitive demonstrations that proved its production efficiency over other machines."

Speed and Maneuverability: "Is quicker on the lift, dump and go than the . . . . . — is more compact . . . gets into smaller places easier and faster." "Is doing a top production job. Power-steer and power-shift combination gives us maximum efficiency from both the machine and the operator."

Easy Operation: "The H-25 is a dandy with its power-steer and power-shift — gets full loads without spinning wheels and the operator lasts longer too." "I like the maneuverability and work capacity."

Reliable: "We find they stand up under tough rugged duty with minimum repairs." "The low maintenance on the H-25's has been way superior to any loader previously used. It's a real producer, easy to service." "Gives maximum production output under ideal *or* adverse conditions."

The satisfaction being delivered by the 2500-lb. capacity model H-25 is a reflection of the kind of performance built into *all* "PAYLOADER" units. There are 20 models in 8 capacity ranges — up to 12,000 lbs. operating capacity — to meet your needs, and a nearby HOUGH Distributor to serve you. He has the finest parts and service facilities, backed by factory service personnel to keep your "PAYLOADER" investment profitable.

HOUGH®

THE FRANK G. HOUGH CO.
LIBERTYVILLE, ILLINOIS
SUBSIDIARY — INTERNATIONAL HARVESTER COMPANY

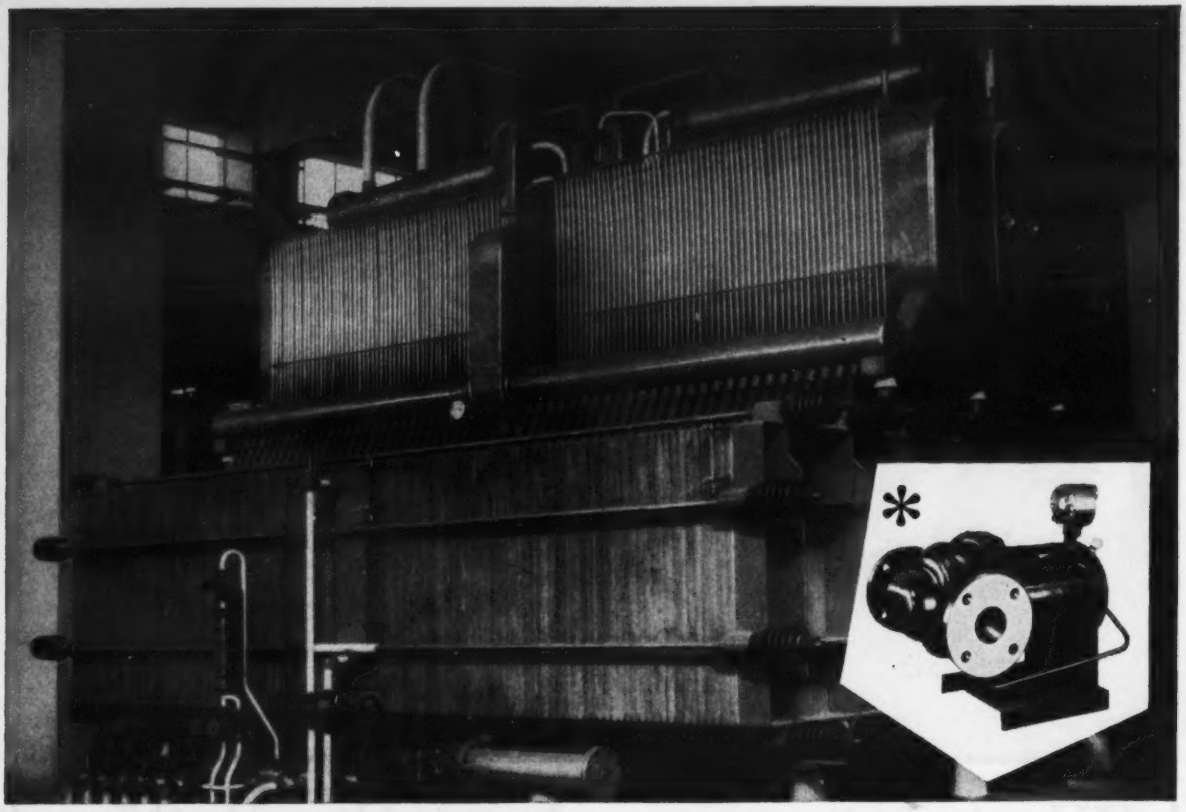
THE FRANK G. HOUGH CO.
744 Sunnyside Ave., Libertyville, Illinois

_____ Send "Industrial Materials Handling the 'PAYLOADER' Way"

Name _____
Title _____
Company _____
Street _____
City _____ State _____

9-A-1

Check 4609 opposite last page.



120 Chempumps Work 365 Days a Year In the World's Largest Electrolysis Plant

Leakproof Chempumps are eliminating pump maintenance worries and downtime at the world's largest water electrolysis plant, operated by Hindustan Chemicals and Fertilizers, Ltd., at Nangal, India. Enormous quantities of hydrogen are produced for use in much-needed fertilizers for Indian farmers.

One hundred and twenty double-suction Chempumps provide long, satisfactory life under conditions of infrequent maintenance—a vitally important contribution since the plant produces 800,000 cubic feet of hydrogen an hour and operates continuously 365 days a year.

Two Chempumps in each of the sixty 24′ x 18′ electrolyzers circulate the electrolyte, a 25-30% KOH solution, to the bipolar cells. These pumps combine motor and pump in one sealless unit that prevents leakage or contamination of the electrolyte through elimination of conventional seals and stuffing boxes . . . and assures a continuous, pure supply of electrolyte to the cells.

The Hindustan Chempumps have a capacity of 90-100 gpm at a 3′ head. Extremely small in size, they fit easily into the piping arrangements of the compact electrolyzers. Entirely maintenance-free with the exception of occasional bearing checks, they save "considerable time and money" at the Nangal plant.

* High-capacity, low-head Chempumps, using double-suction casings and impellers, were designed and built especially for this installation. Hydraulic balance, plus extremely low motor loading, assures uninterrupted operation for Hindustan, particularly important where maintenance is necessarily infrequent. By eliminating seals and stuffing boxes, Chempump "canned" pumps eliminate 90% of pump problems for processors throughout the world.

To learn what Chempump can do for you, write for COMPOSITE BULLETIN 1100. Chempump Division, Fostoria Corporation, Buck and County Line Roads, Huntingdon Valley, Pennsylvania.

First in the field . . . process proved

CHEMPUMP®

Check 4610 opposite last page.

pen is not being discussed in terms of weeks or months but years, yet a storage battery maker has a unique fuel cell developed to the point that it has enlisted the aid of material handling equipment manufacturers in adapting this model to power electric industrial trucks.

This cell, a rechargeable zinc-oxygen unit utilizes economical and plentiful materials apparently ignored by other fuel cell investigators. It operates at nearly normal temperatures and pressures, produces no waste products to be removed; and can be scaled up or down in size and capacity.

In this model, zinc is oxidized in a potassium hydroxide



Racer is powered by zinc-oxygen fuel cell

electrolyte as oxygen is admitted under low pressure.

It can be reversed (recharged electrically) to restore full power potential or the design can be modified to permit the electrode to be removed for recharging outside the cell while a replacement takes over.

The manufacturer predicts that it will provide sufficient power to keep an industrial truck going for 16 to 24 hr before the cell would need be recharged.

(Zinc-oxygen fuel cell is being developed by Exide Industrial Division, The Electric Storage Battery Company, 2 Penn Center Plaza, Philadelphia 1, Pa.)

Check 4611 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.



One-man box-car loading

. . . and up to 10 times increased storage capacity for virtually any dry, bulk material is claimed for centrifugal-action, bulk-material handler.

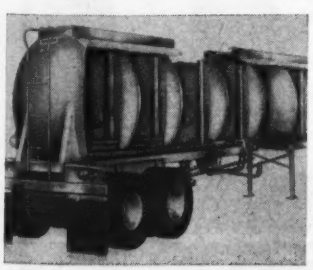
Unit, which utilizes a short high-speed rubber belt to increase velocity of falling material in the feed-spout, features finger-tip control of the motorized discharge swivel, easy up-and-down positioning with hydraulic-powered positioner; and quick swiveling of the entire unit into working position.

(Flinger is development of Conveyor Division, Finco, Incorporated, PO Box 968, Aurora, Illinois.)

Check 4612 opposite last page.

Piggyback tank

. . . opens new avenue to railroads in transportation of liquid-carrying tanks. Fabricated of aluminum, tank strength is increased approximately 20% by utilizing full-length ex-



trusions as primary members for upper and lower portions of shell.

Bottom extrusion allows for improved drainage through uninterrupted channel. Use of two basic extrusions eliminates structural members, reducing weight and increasing

PNEUMATIC UNLOADING AND CONVEYING BY ALLEN-SHERMAN-HOFF

Fast, efficient unloading of materials and their transportation to storage was engineered into this pneumatic conveying system by Allen-Sherman-Hoff. Although designed for a new plant, this system can easily and economically be adapted to existing facilities.

Three unloading stations are provided for. Two accommodate rail cars, a third, not shown, unloads tractor-trailers. The high degree of automation built into this system reduces labor requirements to one man at the switchboard and, when unloading at Station 2, a man operating a pick-up tool.

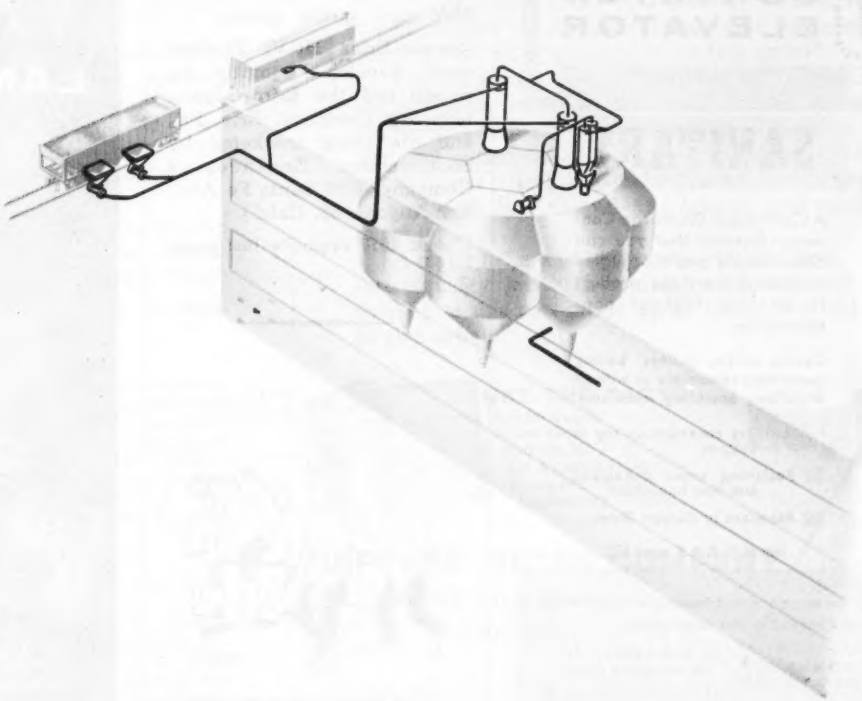
Allen-Sherman-Hoff Pneumatic Materials Handling Systems are in operation throughout the world—we pioneered in this field. You'll find our installations in plants *where reliability of performance is of paramount importance.*

The system illustrated is a page from our *new* Pneumatic Materials Handling Bulletin, PM-1. If you are interested in more efficient materials handling you should have a copy. We'll be happy to send you one, along with the name of your local A-S-H Representative—he's a materials handling expert you should get to know. Write, wire or phone . . .

THE ALLEN-SHERMAN-HOFF COMPANY, 257 East Lancaster Avenue, Wynnewood, Pa.

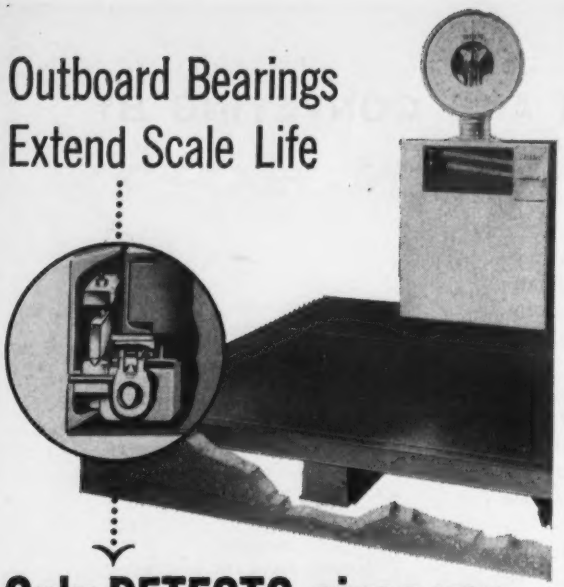
Our new Bulletin PM-1 points the way to Pneumatic Materials Handling for your plant and your materials. It's free for the asking.





Check 4613 opposite last page.

Outboard Bearings Extend Scale Life



Only DETECTO gives you OUTBOARD BEARINGS!

Write for information on full line of industrial weighing equipment from 1/100 oz. to 100 ton:
Detecto Scales, Inc., Dept. J-3, 540 Park Ave., Brooklyn 5, N.Y.

Check 4614 opposite last page.

load-carrying capacity.

Tank can be mounted on specially-designed container flat car.

(Aluminum bulk-liquid container is product of Trailmobile Inc., subsidiary of Pullman Incorporated, Springfield, Missouri.)

Check 4616 opposite last page.

Precision-control feeding to screen separators offered by feeders

Uses: Feeding of dry materials to screen separators.

Features: Precision-control feeding to the center of top screen of separator. Increases basic capacity and improves screening efficiency.

Description: Feeders incorporate specially designed trays, either open or enclosed in stainless or carbon steel, to fit 18, 30, or 48" diam separators.

Electro-permanent magnetic drive for three basic feeder models is supplied by 115, 230, and 460 v AC-operated power units. Feeders have totally enclosed drive mechanism making them dust- and moisture-resistant, and utilize epoxy fibre-glass spring system.

(Sweco-Eriez Hi-Vi Feeders were developed jointly by Sweco and the Eriez Manufacturing Company, Erie, Pa., and are being marketed by Southwestern Engineering Company, 4800 Santa Fe Ave., Los Angeles 58, Calif.)

Check 4617 opposite last page.



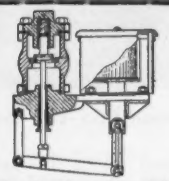
"You know everyone here, don't you, Charlie?"

BIG LINE-UP BIG PERFORMANCE

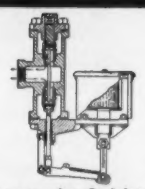
Johnson Solenoid Valves are built for heavy duty service . . . handling, air, water, steam, heavy viscous liquids. No pilots or pistons; powerful leverage design opens smaller valves against 250 lbs. Because of the remoteness of the solenoid, temperatures up to 400° F. are easily handled without adverse effect on the solenoid coil. Bodies are bolted together. Explosion-proof models also.

JOHNSON Direct Operated SOLENOID VALVES

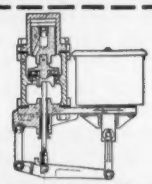




Normally closed service, stainless steel valve and seat. Sizes ⅜"-3". Also for normally open service, and with Jenkins Disc.



3-way valve. Stainless steel valves and seats. Sizes ½"-1½".



Dashpot construction, cushions closing to avoid water hammer. Jenkins Disc. Sizes ¾"-2".

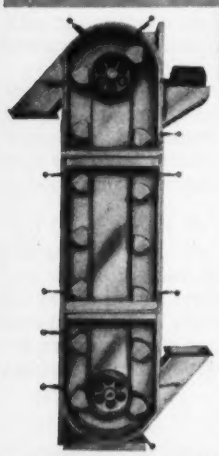
Write for Bulletin "V"

THE JOHNSON CORPORATION
826 Wood St., Three Rivers, Mich.

Check 4618 opposite last page.

buck-el CONVEYOR ELEVATOR

SANITARY



A Centrifugal Discharge Conveyor Elevator that you can clean simply and thoroughly — change from one product to another without contamination.

Casing covers, pulleys, belting completely removable — without disturbing operating machinery.

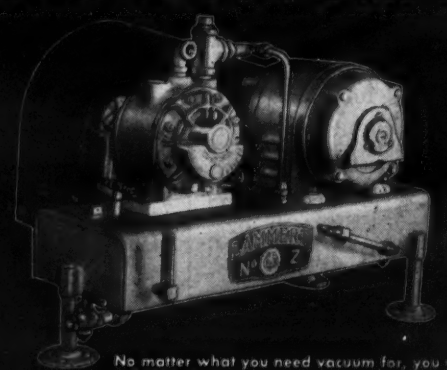
- Sanitary construction top to bottom
- Featuring small capacities and low headroom
- Stainless or Carbon Steel

see us in C e C page 171

NEW IDEAS for elevating and feeding bulk materials
standard designs adapted to your requirements
write or telephone buck-el CONVEYOR ELEVATOR
The Bucket Elevator Co.
tel: CRestview 3-5350
57 Union Place Summit, N. J.

Check 4615 opposite last page.

VACUUM
LAMMERT PUMPS



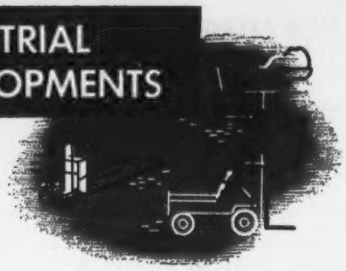
No matter what you need vacuum for, you will get dependable service from automatically lubricated Lammert pumps. Capacities—4.3 to 225 cubic feet per minute. From medium to high vacuum (up to 20 microns of barometer).

Write for catalog showing the complete line, including specifications, of Lammert pumps and compressors.

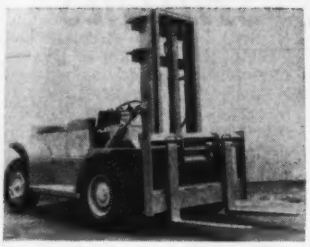
LAMMERT & MANN CO., INC.
1753 Walnut Street, Chicago 12, Illinois, SEeley 3-0383

Check 4619 opposite last page.

LATEST INDUSTRIAL TRUCK DEVELOPMENTS



. . . in design, capacity, operating features, and accessories for improved performance and safety



Minimized maneuvering

. . . for fork truck operators can be obtained with either side shifter or combination side shifter-slope piler attachments designed for use on trucks of 15,000 through 20,000 lbs capacity.

Side shifter allows operator to center forks under load and accurately set down loads in confined areas. It provides maximum shift of six inches on either side of truck's center.

Combination shifter-slope piler consists of shifter plus hydraulic arrangement which pivots forks five degrees about center line of carriage. This enables operator to align forks with load which is not level.

Both attachments use standard forks and can be installed in place of standard carriage.

(A-20 side shifter and combination side shifter-slope piler are products of Industrial Truck Division, Clark Equipment Company, Battle Creek, Michigan.)

Check 4620 opposite last page.

Engine accessibility

. . . is feature of lift trucks with 3000-, 4000- and 5000-lb capacities. To service motor, it is only necessary to tilt forward driver seat. Another time saver is a plug arrangement that splits the wiring harness at the instrument panel and permits quick removal of the panel.

Trucks, available gasoline-powered or diesel-powered, may be obtained with either standard transmission or, as optional equipment, torque converter drive. Emergency brake—independent of standard hydraulic breaking—has two shoes that expand internally to emergency brake drum for positive holding.

(F-30, F-40 and F-50 lift trucks are being introduced by Engine-Material Handling Div., Allis-Chalmers Manufacturing Company, Milwaukee, Wisconsin.)

Check 4621 opposite last page.

'Tireless' tires

. . . is the sobriquet applied by the manufacturer to solid rubber tires for industrial truck use. Designed for rugged duty in railroad yards and carloading operations, tires are puncture-proof.

Series of solid wedges of rubber in fabrics specially laminated give tire resiliency to absorb vibration and shock. This feature also provides greater degree of traction and braking power.

(Solid tires are manufactured by Notat Tire Company, 1504 E. 34th St., Chattanooga, Tenn.)

Check 4622 opposite last page.

Lift truck masts which provide extra-high lift, with normal collapsed-mast headroom clearance—now available for use with manufacturer's 2000-3000-lb capacity gasoline- and electric-powered lift trucks—are described in Bul 2410A—Yale Materials Handling Division, The Yale & Towne Manufacturing Company.

Check 4623 opposite last page.

Fork trucks, designed for narrow aisle operations and featuring motor wheel drive balanced by offset caster wheel, are explained in Bul 621—The Raymond Corporation.

Check 4624 opposite last page.



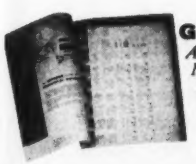
Neptune "Meter with a Memory"

never forgets the formula

Why waste a good man's time counting buckets, remembering formulas, waiting for liquids to creep up to gauge marks, repeatedly running the risk of counting or reading errors?

Let the precise "mechanical memory" of this Neptune repeating Auto-Stop meter do the work. Set the quantity required by the formula just once. Open the valve. The meter does the rest... shuts off automatically at the exact amount. Even prints a batch ticket if you want. The meter "remembers"...delivers the same amount each time the valve is opened until reset for a different quantity.

A meter helps a good operator produce more, with consistently better quality, less back-breaking work, and better housekeeping. Investigate this cost-saving meter today. Our field engineers will be glad to help.



GET THE FACTS
Ask for helpful Meter Data Bulletin 566 Y P. See Neptune Data Pages in Chemical Engineering Catalog.

neptune

Branches in:
ATLANTA • BOSTON
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PHILADELPHIA (Bala Cynwyd)
SAN FRANCISCO (Millbrae)
Canada: Neptune Meters, Ltd.,
TORONTO 14, ONTARIO

NEPTUNE METER COMPANY
LIQUID METER DIVISION
47-25 34th St., Long Island City 1, N. Y.

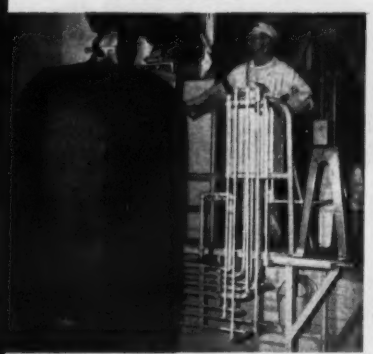
Check 4625 opposite last page.

PROBLEM:

HANDLE SARAN RESIN IN BULK
WITHOUT DANGER OF CONTAMINATION

SOLUTION:

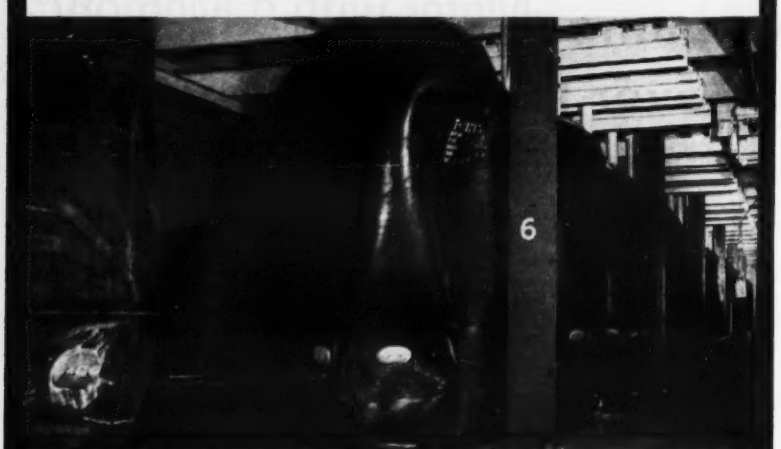
USE PROVEN U.S. SEALDBIN CONTAINERS



Loading Saran into U.S. Sealdbins in a completely closed system guarantees protection from outside contaminates.



Rugged U.S. Sealdbins are their own weather-resistant, hermetically sealed warehouses — unaffected by exposure.



Transferred indoors, U.S. Sealdbins are unloaded in a completely closed system. From filling, to storage, to emptying, Saran Resin remains free of contamination.

Pictured above, U.S. Sealdbins are handling Saran Resin at Dow Chemical Company's Midland, Michigan, plant. Made of high-strength cord fabric and custom-compounded synthetic rubber, U.S. Sealdbins are rated tops in weather and corrosion resistance. Collapsible, they can be returned in but a fraction of their outbound space. Find out how much time, labor and money U.S. Sealdbins can save in your operation. Write, wire or phone

TRANSPORTATION PRODUCTS DEPT.
United States Rubber
10 Eagle St., Providence, R. I., DExter 1-4000

Check 4626 opposite last page.

NEW LITERATURE
Material Handling and Packaging

Piston-type fillers for liquid, semi-liquid and semi-solids chemical and drug products are subject of six-page illustrated bulletin. Specifications and production capacities are shown for one-operator machines from a two-line model to 12-line machine filling up to 290 containers a minute. Geyer Fillers Bul—The Filler Machine Co., Inc.

Check 4627 opposite last page.

Cutting costs of owning and operating various types of industrial trucks is treated comprehensively in four booklets encompassing 62 pages of cost histories and do-it-yourself formulas for quick, accurate calculations and comparison of expenditures. Truck Costs Library—Exide Industrial Division, The Electric Storage Battery Company.

Check 4628 opposite last page.

Bunker vibrator designed to be suspended into bunker directly over discharge opening and consisting of electromechanical rotary vibrator mounted at the top of a long strip of steel is described in Bunker Vibrators Cat—Syntron Company.

Check 4629 opposite last page.

Idlers for belt conveyors are cataloged on 44-page booklet which covers applications and describes more than 800 units. Also covered are selection, maintenance, and how to determine correct idler spacing. Idlers Cat—Barber-Greene Company.

Check 4630 opposite last page.

Magnesium dockboards and portable bridges, light enough for one-man use but strong enough to take loads up to 30,000 lb per axle, are detailed in Dockboard Bul—Whitelight Portable Equipment Division, White Metal Rolling and Stamping Corp.

Check 4631 opposite last page.

Batteries for motive power use in industrial trucks are given comprehensive treatment in 24-page brochure. In addition to descriptive data and illustrations of battery parts including new diamond Z plates, catalog presents discharge characteristics in 10 graphs. Batteries Brochure—Gould-National Batteries, Inc.

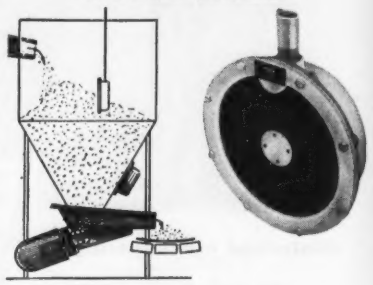
Check 4632 opposite last page.

Pneumatic conveying's role in solving handling problems of taconite pelletizing plant is reported in Fact File ER-33-1—Fuller Company.

Check 4633 opposite last page.

reduce bulk materials costs with equipment of proven dependable Quality

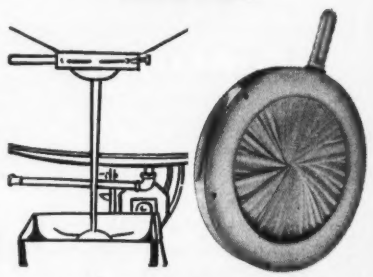
SYNTRON
HOPPER LEVEL SWITCHES



. . . automatically maintain minimum and maximum amounts of fine to coarse, granular bulk materials in bins or hoppers. Start and stop supply and discharge feeders. Prevent overflowing of bins and cut operating costs.

Stainless steel or neoprene diaphragm
Easy to install, easy to maintain.

SYNTRON
FLOW CONTROL VALVES



—provide a clog free, positive control and shut off of free flowing bulk materials from bins and hoppers.

The principal feature of a SYNTRON Flow Control Valve is the flexible diaphragm which forms a concentric aperture—which may be opened to any desired flow position and held against the head load of material or closed completely without jamming or clogging.

Easy to install. Easy to maintain. Flexible diaphragm can be replaced easily at low cost.

Write for free catalog data on SYNTRON Hopper Level Switches and Flow Control Valves.

SYNTRON COMPANY
Quality Equipment Since 1931
110 Lexington Ave. Homer City, Penna.

Check 4634 opposite last page.

Auger filling machines, both automatic and semi-automatic, are depicted in eight-page folder which explains basic principle and inherent advantages of auger filling for powder, paste and granular products and is complete with schematic drawings. Auger Filling Bul—FMC Packaging Machinery Division, Food Machinery and Chemical Corporation.

Check 4635 opposite last page.

Powered strapping tools and applications for increasing packaging speed, reducing operator fatigue and producing more secure packages are described in 16-page Strapping Tool Booklet—Acme Steel Company.

Check 4636 opposite last page.

Slide gates, for attachment to existing duct work, hoppers, screw conveyors, bucket elevators or other process machinery to control or shut off flow of bulk materials, are described in Slide Gates Bul—The Bucket Elevator Company.

Check 4637 opposite last page.

Pneumatic conveying systems for such applications as unloading railcars or trucks; transporting to storage, weighing, mixing and feeding for batch operations; and controlled feeding to process are covered in Bul PM-1—The Allen-Sherman-Hoff Company.

Check 4638 opposite last page.

Lift trucks in the 3000-lb, 4000-lb and 5000-lb capacity ranges are introduced in eight-page Cat Bu-640—Engine-Material Handling Division, Allis-Chalmers Manufacturing Company.

Check 4639 opposite last page.

Flexible packaging equipment which measures, forms, fills, seals and labels free-flowing products is presented in eight-page Fexible Packaging Bul—Hayssen Manufacturing Company.

Check 4640 opposite last page.

Table feeders for feeding dry chemical compounds accurately at low rates are explained in Bul 50.20-2—B-I-F Industries.

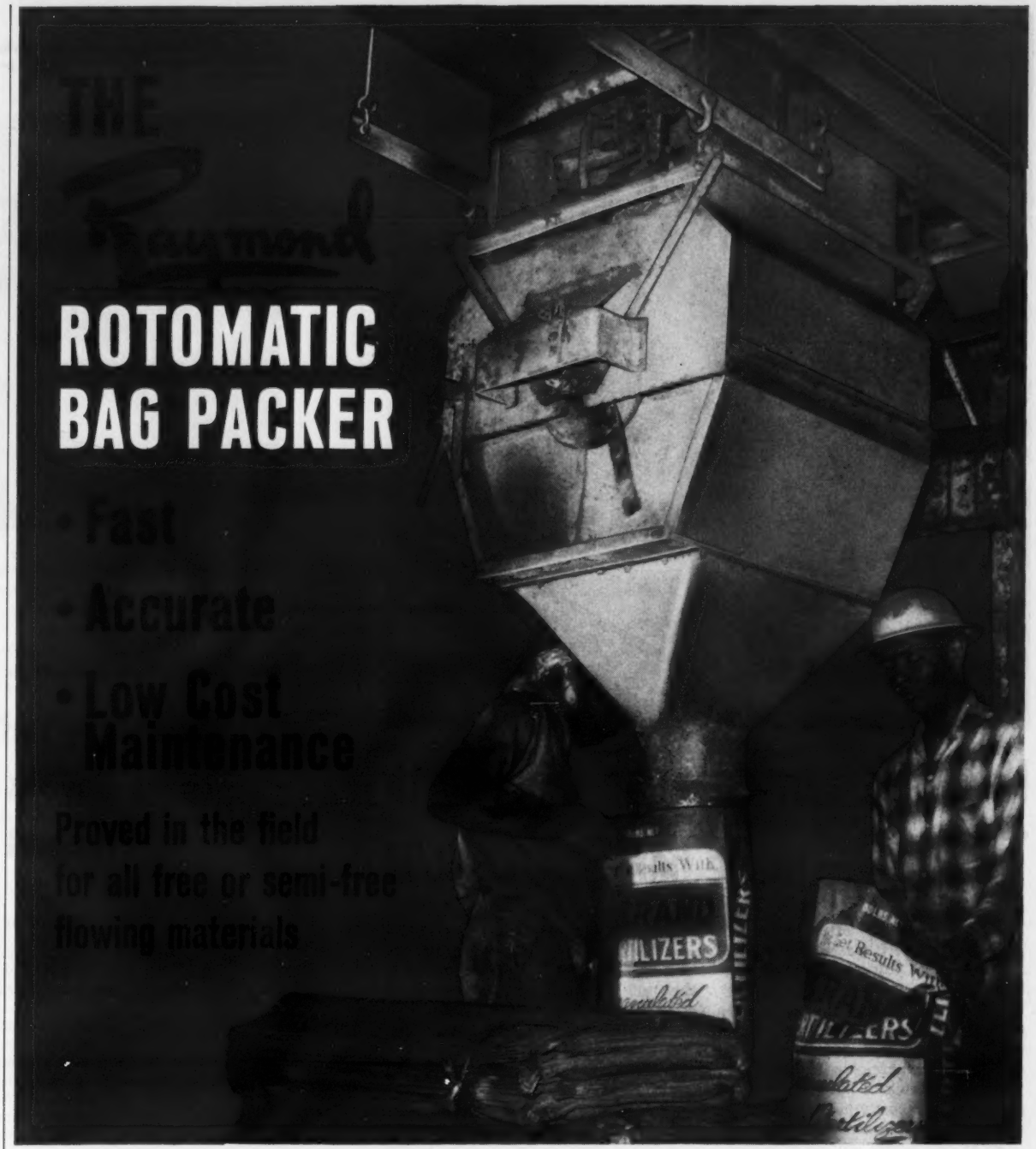
Check 4641 opposite last page.

Screw-conveyor drives are detailed and applications, design features and accessories described in Bul 7106—The Falk Corporation.

Check 4642 opposite last page.

Bag holders, available for either manual or air-operation, are detailed in Bul 0259—Richardson Scale Co.

Check 4643 opposite last page.

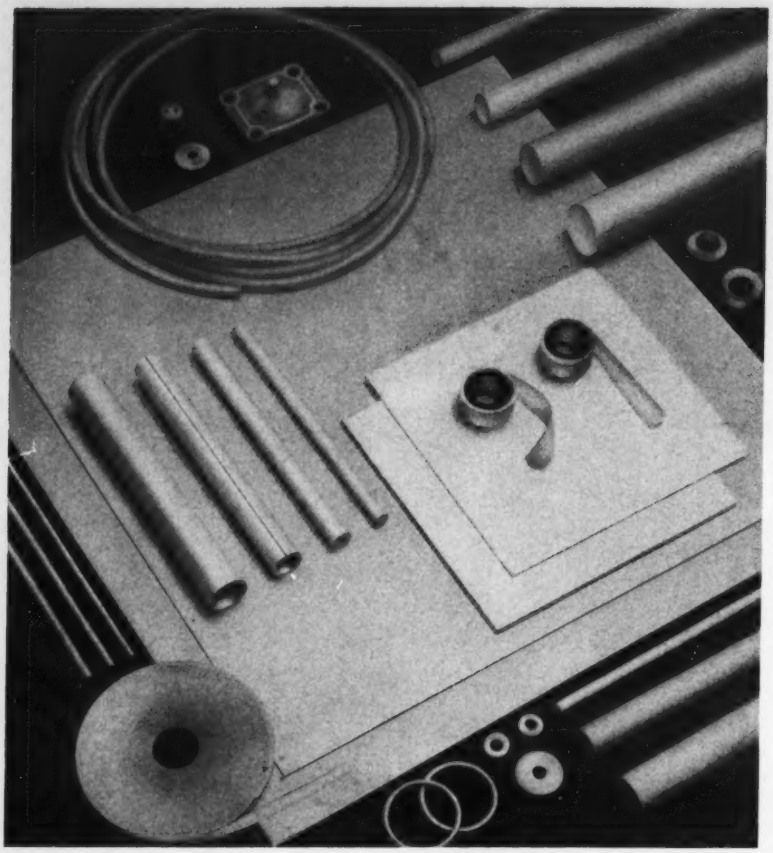


That's right! Speed, Accuracy and low-cost maintenance . . . proven in full production line operation. It's the Bag Packer that can give you new economy in your bag packing operation. The Raymond Rotomatic Packer is fully automatic, all mechanical, and requires no outside motivation such as electricity or compressed air. It is gravity operated and uses the even balance scale principle to deliver proved accuracy. Get complete details now from your Raymond representative or write



Raymond BAG CORPORATION
Middletown, Ohio • A Division of Albemarle Paper Mfg. Co.
Atlanta • Baltimore • Chicago • Kansas City • Louisville • New York
"Maker of RUGGED MULTIWALL PACKAGING for Industry"

Check 4644 opposite last page.



Now you can do even more with TEFLON – made bondable by R/M

Time was, you'd often rule out "Teflon"* where it was sorely needed, simply because you couldn't make anything adhere to it.

But not now. R/M has perfected a process that makes "Teflon" easily bondable to other materials and to itself with commercial adhesives. Now you needn't think of intricate "Teflon" parts as single costly pieces or as elaborately fastened assemblies.

R/M can supply you with "Teflon" sheets and tape etched for bonding. Thus you can use the chemical inertness and the superior electrical properties of "Teflon" without worrying about how to make it stay put. In fact, you can take advantage of bondability and non-bondability in the same R/M "Teflon" part.

A lot is happening in "Teflon" daily. To keep up with it, talk "Teflon" with the R/M man—learn of R/M's *complete "Teflon" service* that can help you cut pieces and maintenance costs without cutting corners. Call one of the offices listed below or write Plastic Products Division, Raybestos-Manhattan, Inc., Manheim, Pa.

*Du Pont trademark for its TFE-fluorocarbon resin

R/M

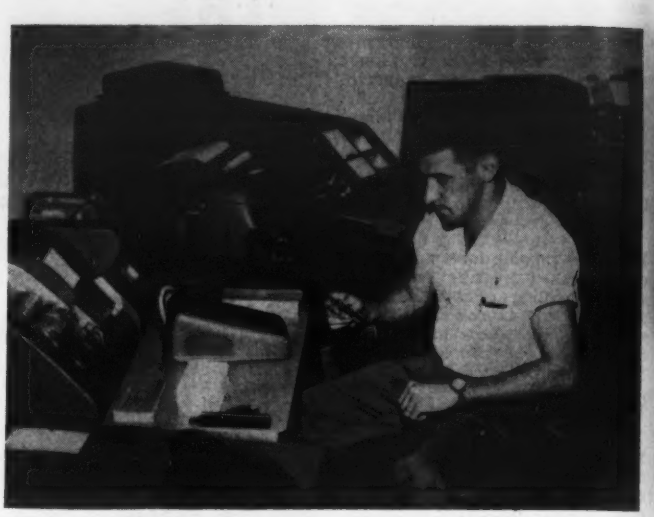
PLASTIC PRODUCTS DIVISION
RAYBESTOS-MANHATTAN, INC.
Manheim, Pa.

BIRMINGHAM 1 • CHICAGO 31 • CLEVELAND 16 • DALLAS 26 • DENVER 16 • DETROIT 2
HOUSTON 1 • LOS ANGELES 58 • MINNEAPOLIS 16 • NEW ORLEANS 17 • PASSAIC • PHILADELPHIA 3
PITTSBURGH 22 • SAN FRANCISCO 5 • SEATTLE 4 • PETERBOROUGH, ONTARIO, CANADA

SPECIALISTS IN ASBESTOS, RUBBER, SINTERED METAL, ENGINEERED PLASTICS

Check 4645 opposite last page.

cp IDEAS: from other industries and nuclear field — new trends in research, process, services



Clerk C. J. Ford at Grand Isle prepares to send punched card data via microwave to New Orleans. IBM equipment is used to process, punch and send messages

Problem in Communications

Microwave radio breaches bogs, spans bayous and bays to link Freeport Sulphur facilities

Microwave Radio—Tool For Whom?

With the Federal Communications Commission indicating it may soon make private microwave radio available for American business, the question arises: What kind of operation can economically use this medium?

Briefly, a microwave system provides fixed-point to fixed-point radio communications operating on frequencies on the order of 6000 megacycles. Up to 600 voice conversations can be carried simultaneously on one signal by multiplexing. Range, limited to line-of-sight distances (25 to 30 miles over flat terrain), can be extended indefinitely by use of repeater stations.

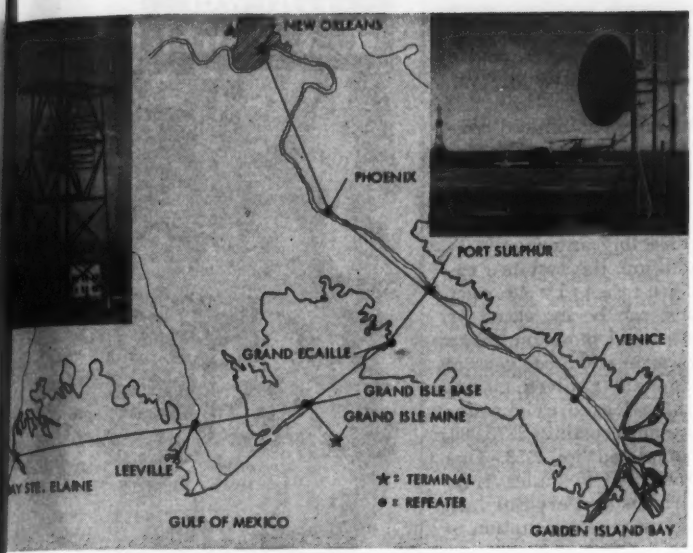
Due to FCC restraints, business experience has been limited to right-of-way organizations.

One exception is Freeport Sulphur Company, which gained a license because common carrier communications are non-existent in the section southern Louisiana where it operates. That story is told here.

While Freeport Sulphur's specialized operation provides an indirect basis for comparison with other operations, there is a rule-of-thumb which may help you evaluate it for your purposes.

When a sizeable number of voice, teletypewriter, facsimile or other circuits are needed to connect a company's various facilities, microwave can be less expensive than leasing common carrier facilities.

For example, the cost of operating a private microwave system between facilities 100 miles apart on normal terrain is about the same as leasing lines when 10 to 12 circuits are necessary. If capacity requirements exceed this break-even point, microwave's advantage increases. In addition, microwave offers simplified maintenance and system flexibility. THE EDITORS



Three-legged microwave network links four mines, plant to New Orleans office of Freeport Sulphur Company. Marshy bogs make conventional system impractical. (Inset, left) Technician mounts microwave tower atop Commerce building, New Orleans. (Inset, right) Pan sits atop living quarters of Grand Isle Mine seven miles offshore

JAY GOSSETT, Assistant Editor
with **A. J. LEHMAN,** Senior Electrical Engineer
Freeport Sulphur Company, New Orleans, Louisiana

Mention of Louisiana's Gulf Coast commonly evokes images of serene bayous shaded by moss-laden cypress trees whose gnarled trunks and limbs writhe skyward from submerged roots.

For an engineer, however, who has built an inter-plant communications network through 230 miles of this picturesque terrain because there are no common carrier facilities, the vision is less enthralling.

He is more likely to recall the frustrations of trying to breach treacherous waterways with equipment, poles and wire, or the morale-sapping sight of a wooden pile sinking 40′ into soft muck from a single nudge of a pile driver.

At least that is what happened when Freeport Sulphur Company ran one four-circuit open-wire line 10 miles—across two bayous—from the Grand Ecaille mine to its storage and shipping headquarters at Port Sulphur many years ago.

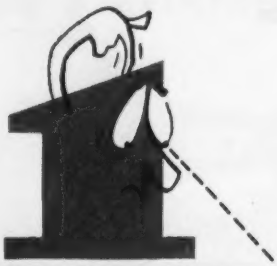
Several years later—in 1952—the company needed to link the New Orleans office with Port Sulphur, 40 miles southwest; Garden Island Bay mine, 80 miles southwest; Grand Ecaille mine, 45 miles south; and Bay Ste. Elaine, 65 miles southeast.

With the Grand Ecaille lesson ruling out conventional communications, the search for alternatives led inevitably to microwave radio. Installation and maintenance costs compared favorably with other alternatives.

Instead of countless poles for overhead lines, the original system required only a tower at each of five terminal stations and three repeaters. In some instances, existing water towers or tall buildings were used to support anten-

To next page

Why pay **FULL** *price*
for only



a floor?

2

CEILCOTE CORROSION-PROOF MONOLITHIC FLOORING GIVES YOU GUARANTEED PERFORMANCE!

INSTALLATION AND MATERIALS ARE EQUALLY IMPORTANT!
You can't buy a bucketful of corrosion-proof flooring! The success of any flooring is determined by correct installation techniques as well as quality materials. Only Ceilcote offers you a *complete flooring service* . . . Corocrete monolithic flooring plus performance guaranteed installations. And Corocrete is scientifically formulated with the proper balance of resins, special aggregates and hardeners to meet your specific requirements!

INSIST ON THIS COMPLETE PACKAGE!
Ceilcote provides corrosion engineers to analyze your problems . . . produces the correct grade of Corocrete . . . prepares the surface and installs the flooring . . . all under one contract! Available with finishes ranging from non-skid to polished surfaces, Corocrete floors resist acids, alkalis, impact . . . are engineered to withstand thermal shock and expansion without cracking or spalling.

PROFIT FROM CEILCOTE'S EXPERIENCE!
Ceilcote offers you 33 years of experience in developing, manufacturing and installing reliable corrosion proofing materials for industry.

WRITE TODAY FOR COMPLETE INFORMATION

CEILCOTE
THE CEILCOTE COMPANY, INC.

9821-CC
The Ceilcote Company
4834 Ridge Road
Cleveland 9, Ohio
Please send me complete information about your complete flooring service.
Name_____
Company_____
Street_____
City_____ Zone_____ State_____

Check 4646 opposite last page.

1ST

IN QUALITY AND PRODUCTION



HARRISBURG CYLINDERS

Because Harrisburg Steel has never settled for anything less than the best in quality controls and production methods, the service life of their gas cylinders, which is usually over 30 years, has become the basis of standards for the industry. No other cylinder manufacturer can make this claim for only Harrisburg and Taylor-Wharton, both divisions of Harsco Corporation, have made cylinders for over 30 years.

More than a Century in Harrisburg 24, Pa.

H HARRISBURG STEEL CO.

Division of HARSCO CORPORATION



TUBES TRANSPORTS FLANGES COUPLINGS

Check 4647 opposite last page.

nas which range up to 250′.

Maintenance problems were simplified with only 10 locations (the present expanded system) at which trouble can occur.

Microwave also offered flexibility—the system can be extended by simply installing radio and multiplex equipment at the desired terminal and redirecting antennas.

In addition, the system's capacity, currently 48 voice channels, can be increased by adding several more multiplex transmitters and receivers at the terminals involved.

A three-legged, eight-station system, costing $275,000, was completed in 1953. One leg stretches 40 miles from New Orleans to Port Sulphur, requiring a repeater station at Phoenix.

The second leg spans 40 miles—with repeater station at Venice—between Port Sulphur and Garden Island Bay.

Stretching about 75 miles, the third leg covers 10 miles from Port Sulphur to Grand Ecaille and then continues to Bay Ste. Elaine. A stub, installed in 1959, connects the base to the offshore Grand Isle mine.

Direct Dialing and Data Transmission Used

Most channels terminate in PBX automatic switchboards at various mine offices and plants. A person in any of the seven installations can dial direct to any other in-plant telephone at the other facilities.

A few channels are reserved for other purposes. One controls remote VHF mobile radio base station at Leeville, enabling dispatch centers in Grand Ecaille and Port Sulphur to contact radio-equipped vehicles and boats in that area.

An indication of things to come—both at Freeport Sulphur and for business in general—is the use to which another channel is put. Since the Grand Isle mine lacks accounting and administrative service facilities, data transmission facilities were added to the network.

Card punching and readout



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Ducon UW-4 Dynamic Wet Dust Collectors have added a new dimension in dust recovery. They have replaced, with outstanding success, many more costly and less effective dust collectors in the recovery of "difficult" materials, such as fine and abrasive dusts in kilns, rotary driers and other applications.

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Ducon UW-4 Washers offer other unique advantages, including constant air capacity, low water consumption and rugged construction. They are self-cleaning and fire and explosion proof.

Send for Bulletin W-7456.

DUCON DUST CONTROL SYSTEMS AND EQUIPMENT

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THE Ducon COMPANY Inc.

147 EAST SECOND STREET • MINEOLA, L. I., NEW YORK

Check 4648 opposite last page.

devices are located at both Grand Isle and New Orleans. Although experimental, this channel is used daily to transmit cost statistics, time reports and weather reports. Eventually, it will also carry meal lists, warehouse issues, stock orders, well data, letters and announcements.

(Microwave equipment, including micro-package and MR-20 RF units, and MC-10 multiplex equipment used in the Freeport Sulphur Company network, are provided by Motorola Communications and Electronics, Inc., 4501 West Augusta Blvd., Chicago 51, Illinois.)

Check 4650 opposite last page.

Energy of free radicals converted into useful forms of power

Packaged power plants operating continuously and independently of conventional power sources are envisioned as outgrowth of experiments in which free radicals are converted directly into electricity and other forms of power.

In the tests, details of which were withheld, constant streams of highly reactive particles are being produced in a safe, simple and seemingly self-sustaining system, according to the inventor, Stanford R. Ovshinsky. Their natural atomic reactions are being controlled at near room temp and their energy converted directly into useful forms of power.

(Free radical energy converters are being developed by Energy Conversion Laboratories, 14121 West McNichols Rd., Detroit 35, Mich.)

Check 4651 opposite last page.

AEC contracts and procurement-procedure revisions and innovations are covered in one new and one revised chapter to official AEC manual. Copies of Chapter 9111 (revised) and Chapter 9118 (new) can be purchased for $1.30 and $1.05 respectively from Office of Contract Policy, Atomic Energy Commission, Washington 25, D.C.



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The Fluid Energy "Jet-O[illegible]" Mill[illegible] signed and built by the pioneers in fluid energy fine grind[illegible] does [illegible]ore than produce fine particles. It controls fineness and produ[illegible]uality with a narrow distribution range and simultaneously with grinding can dehydrate, coat particles, blend and achieve chemical changes.

Jet-O-Mizer Mills are being used all over the world, processing many types of materials in the following industries:

- **Abrasive**
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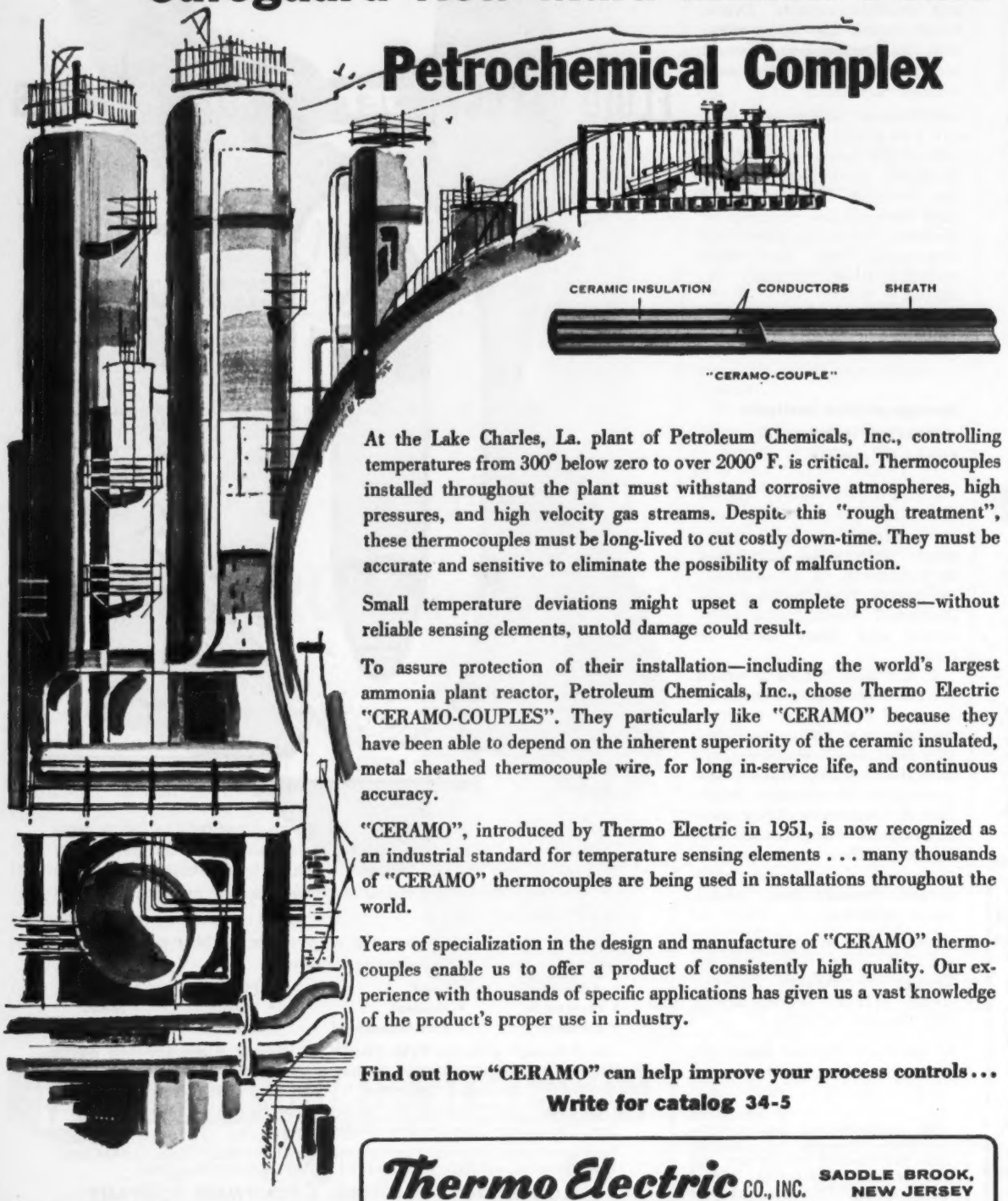
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(Formerly known as the Wheeler-Stephanoff Mill)

Check 4652 opposite last page.

1,000 Ceramo® Thermocouples Safeguard New Multi-Million Dollar Petrochemical Complex



"CERAMO-COUPLE"

At the Lake Charles, La. plant of Petroleum Chemicals, Inc., controlling temperatures from 300° below zero to over 2000° F. is critical. Thermocouples installed throughout the plant must withstand corrosive atmospheres, high pressures, and high velocity gas streams. Despite this "rough treatment", these thermocouples must be long-lived to cut costly down-time. They must be accurate and sensitive to eliminate the possibility of malfunction.

Small temperature deviations might upset a complete process—without reliable sensing elements, untold damage could result.

To assure protection of their installation—including the world's largest ammonia plant reactor, Petroleum Chemicals, Inc., chose Thermo Electric "CERAMO-COUPLES". They particularly like "CERAMO" because they have been able to depend on the inherent superiority of the ceramic insulated, metal sheathed thermocouple wire, for long in-service life, and continuous accuracy.

"CERAMO", introduced by Thermo Electric in 1951, is now recognized as an industrial standard for temperature sensing elements . . . many thousands of "CERAMO" thermocouples are being used in installations throughout the world.

Years of specialization in the design and manufacture of "CERAMO" thermocouples enable us to offer a product of consistently high quality. Our experience with thousands of specific applications has given us a vast knowledge of the product's proper use in industry.

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Write for catalog 34-5

Thermo Electric CO., INC. SADDLE BROOK, NEW JERSEY

In Canada: THERMO ELECTRIC (Canada) LTD., Brampton, Ontario

Check 4653 opposite last page.

IDEAS

Process speeds recovery of hydrocarbon solvents from resins

More efficient and economic recovery of hydrocarbon solvents from resins is being accomplished through the use of rotary drying equipment. Operating on a vapor recycling system, process can be used for removing such solvents as methyl alcohol, methyl acetate and hexane from polyvinyl alcohol, polypropylene, polyethylene and other resins.

One of the big advantages is cost. The direct-heat drying equipment is said to cost less than conventional dryers currently used for this purpose.

Heated solvent vapors enter the dryer where they serve as heat vehicle for evaporating the solvent from the product. Vapors leaving dryer enter primary cylone, pass through a cloth-type filter (or wet scrubber) where fines are removed.

Cleaned vapors pass through heat exchanger where they are heated and then recycled to dryer for reuse as heat vehicle.

Overall processing time is reported to be less than with conventional techniques. Heat decomposition of product is negligible.

(Further information about solvent recovery process may be obtained from Standard Steel Corporation, 5001 S. Boyle Ave., Los Angeles 58, Calif.)

Check 4654 opposite last page.



"Hmmmm? !"

THAT'S INTERESTING

Nuclear mining

Use of nuclear explosions to mine sulfur is proposed by John M. Dales and Robert C. DeHart, Southwest Research Institute, San Antonio, Texas, in paper presented at joint meeting of AIChE and Instituto Mexicano de Ingenieros Quimicos in Mexico City.

Using conventional rotary drilling techniques, the atomic device would be lowered to the sulfur deposit and detonated there. Blast would raise sulfur to molten state and it could be recovered at less cost than using Frasch process.

Research returns

The $4 billion invested by the U.S. in research in 1955 will add $100 to $200 billion to our economy in 20-odd years, say economists of Arthur D. Little, Inc.

For more information on product at right, specify 4655 see information request blank opposite last page.



WHO FORGES THE TOUGH ONES? . . .
and nitride-hardens them, too?

National Forge does it—with a nitriding installation that is one of the largest and most modern in existence. Now diesel crankshafts, pump eccentrics, compressor pistons and rods, gears, marine couplings, and many other machinery parts are not only *forged* at National, but *nitride-hardened* to add strength and reduce wear. Vertical nitriding furnaces like the one illustrated will accommodate forgings up to 16 feet in length.

National Forge also has its own basic electric melting facilities and produces all the usual types of nitriding steels, including the recently developed 5% nickel, 2% aluminum grade. For further information, write for bulletin NH-1058.

NF

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NF 60-61

For more information on "the tough ones," and the machinery that makes them "best"—write for bulletin NFO



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Figure 2: Air exhausted from hood and adjacent animal isolation room is conducted through ducts to ceiling-mounted air incinerator for sterilization at 400°F before being discharged into atmosphere

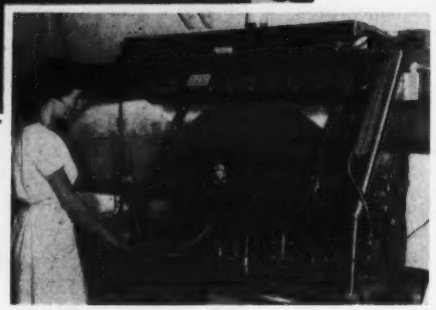


Figure 1: For maximum protection, tests involving infectious materials are performed in this stainless steel hood

Incinerator bars air-borne SPREAD of disease from lab

Ceiling-mounted, gas-fired unit overcomes space, power limitations while providing economical, maintenance-free sterilization

JAY GOSSETT
Assistant Editor
with
JOHN J. DYLE
Chief Draftsman
Plant Engineering Department
Parke, Davis and Company
Detroit, Mich.

Problem: When the Parke, Davis and Company Research Department undertook a project in the field of respiratory diseases early in 1954, the company first had to grapple with the question of how to prevent air-borne spread of infectious agents.

For maximum safety, all work involving infectious materials was performed in stainless steel hoods (Figure 1) and small animals used for testing purposes were isolated in an adjacent room.

Air from these hoods and the animal room was exhausted through ducts and could be sterilized before being discharged into the atmosphere.

Space was at a premium, limiting size of sterilization equipment. Electrically-operated equipment would require installation of a new power cable from a remote sub-station.

Solution: After considerable study, air incineration was selected as simplest and most effective means of resolving problem. Electrical incinerators were vetoed because of the power situation, reducing the choice to a gas-fired incinerator.

An incinerator, 4′ x 2′1¼″ x 2′8″, was designed and fabricated to handle a volume of 600 cfm (70°F equivalent) at 400°F operating temperature. Using natural gas, its rated capacity is 220,000 Btu/hour.

Because of the relatively small volume and the space limitations, it was decided to use a ceiling-mounted unit (Figure 2).

Constructed with an inner liner of 16-gage steel and outer liner of 20-gage steel

sandwiching a four-inch layer of magnesia insulation, sterilizer is complete unit consisting of enclosed fan, gas burner, internal baffles, remote operating controls and remote thermometer.

Operation is completely automatic. When "start" button is depressed, exhaust fan motor is energized and gas burner ignited — after a short time-delay. Motorized dampers, positioned in the ducts leading to the hood and animal isolation quarters, are then opened and exhaust air passes through the sterilizer and is discharged into atmosphere.

Results: Sterilizer has been in operation at full capacity for about five years, requiring no maintenance other than occasional lubrication of exhaust fan bearings.

So well did the first unit perform that when the expanding research program required increased sterilization facilities, a second unit (5′ x 2′3″ x 2′4″) with a 1500-cfm capacity was installed. The burner — rated at 650,000 Btu/hr — has an output of 535,000 Btu/hr, somewhat less than capacity. This unit also has been in maintenance-free operation about five years.

Although actual fuel usage and cost figures on the operation of the sterilizers are not available, on the basis of local natural gas costs (approximately 60¢/million Btu) and Btu output of burners, a comparison can be drawn. The original sterilizer, having a burner output of 215,000 Btu/hr, uses approximately 215 cu ft/hr at cost of 13¢/hr. The second sterilizer having burner output of 535,000 Btu/hr, uses approximately 535 cu ft/hr at cost of 32¢/hr.

(Sterilizers were designed and fabricated by Catalytic Combustion Corporation, 4725 14th St., Detroit 8, Mich.)

Check 4658 opposite last page.

For more information on developments in this section, check the Reader Service Slip.

Consolidate all your plant "waste heat" sources with this unique

Vogt multi-stream

STEAM GENERATOR



Put unused sources of heat to work by concentrating them in a Vogt Multi-Stream Steam Generator.

The purpose of the design is twofold. First, it is possible to utilize several hot streams if there is insufficient heat recovery in one stream. Second, if one hot stream is used it can be split into several circuits whereby the flow is only one-tube-per-pass. This prevents plugging of tubes when handling fouling or polymerizing liquids.

The design incorporates a number of separate circuits enclosed in a single shell. The circuits are independent of each other and each stream can be separately shut off and cleaned without affecting the operation of the others. Thus the unit can be kept continuously on the line by operating one or more streams.

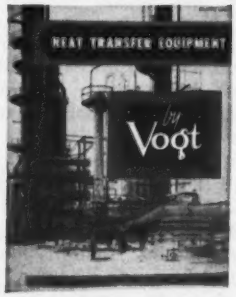
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Check 4659 opposite last page.

Crystalline materials cut cost of making nuclear fuels

Fuel elements have greater density, more efficiency

Crystalline fuel materials are lowering the cost of fabricating nuclear fuels — thereby helping to reduce the overall cost of generating power in nuclear plants. The new fuels are uranium dioxide, thorium dioxide, uranium-thoria in solid solution, triuranium octoxide, uranium monocarbide and uranium dicarbide.

Fuel elements can be prepared from the materials by vibrationally compacting the crystalline product inside the fuel rod. Resultant tube density is higher than attainable with sintered, ceramic fuel pellets. The crystalline fuels may also be swaged into compact fuel rods.

Fuel loss during fabrication is reported to be only 0.25% as compared to 1% with conventional ceramic materials. Power efficiency of the element is higher because fuel tube density is boosted from 88-89% to 91-92% of theoretical density. Reprocess scrap is cut from 15-20% to less than 5% by use of crystalline fuels.

(Crystalline nuclear fuels were developed by Spencer Chemical Company, Dwight Building, Kansas City 5, Mo.)

Check 4660 opposite last page.

Automatic print reader to bypass bottleneck in machine translation

Tests this month are expected to confirm the capability of an automatic print reader to overcome one of the toughest bottlenecks in the road to machine translation of foreign languages.

Translater, developed by the Air Force has potential top speed of 2100 words/minute (Russian to English), but is limited by inability of human operator to supply more than 40 words/minute to it. Under present system,



translater is fed a tape punched simultaneously as operator copies Russian text on typewriter.

Optical-electronic print reader which recognizes alphabet characters, punctuation marks, and numbers from filmed copy of original, has capacity of 1,000 Russian characters/second (approximately 12,000 words/minute.)

Used with automatic translater, it will operate at rate about 60 times as fast as a typist.

Cost of automatic print reading is estimated at 1/20¢/word as compared to ¼¢/word for typing and tape-punching.

(Automatic print reader is being developed by Baird-Atomic, Inc., 33 University Rd., Cambridge 38, Mass.)

Check 4662 opposite last page.

NEW LITERATURE

Ideas and New Trends

Low-temperature nuclear process heat is topic of 74-page book published by AEC. Report covers proceedings of the 1959 Symposium on the subject. Technical and economic factors are reviewed. Report TID-7580 may be obtained by submitting 75c direct to office of Technical Services, U. S. Department of Commerce, Washington 25, D.C.

Scraper sludge collector and scum remover, first in line of scraper and kimmer mechanisms designed to meet specific requirements of municipal and industrial treatment plants, is introduced in Bul 315-6A1 — Conveyor & Process Equipment Division, Chain Belt Company.

Check 4663 opposite last page.

Radiation detection instruments which are transistorized and battery-operated for personnel use are introduced in Radiation Safety Bul — Gelman Instrument Company.

Check 4664 opposite last page.

Tritium foils and targets, including applications and information on backing, content, ion current and titanium thickness, are presented along with current price list in Data Sheet 20.70 — U.S. Radium Corp.

Check 4665 opposite last page.

MEANS YOU CAN QUICKLY MODIFY THE SAME PUMP FOR DIFFERENT CAPACITIES

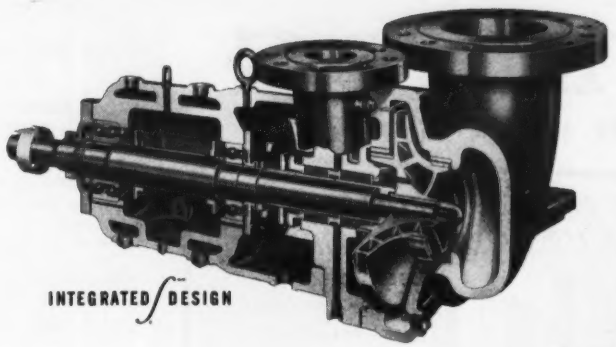
Component interchangeability permits desired pump to be assembled from standard components in a minimum of time.

Recently a large process plant in the gulf coast decided to increase its output. In the process of redesign it became necessary for a particular group of pumps to handle double their capacity. Because these pumps were integrated Peerless Type PR units, the solution was simple. By merely changing the impeller and volute, these pumps were ready to handle the higher pumping capacities required.

Unusual example? Not at all. Rather it is typical of the versatility designed and built into this line of high pressure, high temperature Peerless process pumps. Peerless PR and PRS pumps offer many other advantages. Virtually all liquids in refining processes can be pumped by these units. Widest capacity and head conditions are easily met. And the maximum interchangeability factor materially reduces inventory costs. Get the best for process pump needs, specify and buy Peerless. Send for informative Bulletin No. B-1605 now.

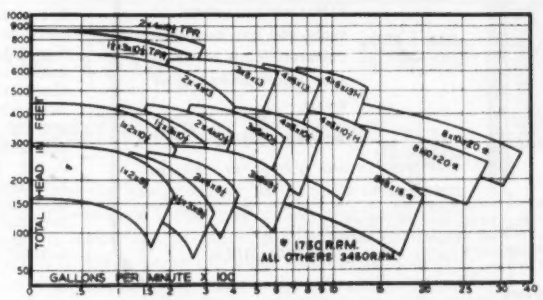
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Check 4666 opposite last page.

IDEAS

Coagulant aids, used to speed and improve coagulation and sedimentation in municipal and industrial water clarification systems are discussed in eight-page brochure. Products are effective over wide pH range and can be dry fed or introduced as slurries. Bul HSP-919—Hagan Chemicals & Controls, Inc.

Check 4667 opposite last page.

Refinery waste disposal and inspection of refinery equipment are subject of two publications. Waste Disposal Supp ($1.00) and Inspection Guide ($2.00) may be obtained from Publications Dept., American Petroleum Institute, 1271 Avenue of the Americas, New York 20, N.Y.

Stock agitation with circulating pumps is subject of four-page Tech Bul 254A — Warren Pumps, Inc.

Check 4668 opposite last page.

Olefin plants and description of process for manufacturing olefins are highlights of illustrated 12-page brochure. Chapter on pyrolysis includes graph showing olefin yield as function of conversions. Economic significances of olefin plant designing are also discussed. "Olefin Plants"—The M. W. Kellogg Company, a Subsidiary of Pullman Incorporated.

Check 4669 opposite last page.

Catalytic oxidation for air pollution, control, waste recovery and condensate elimination is discussed in 20-page Oxycat Manual which may be obtained by writing on letterhead to Oxy-Catalyst, Inc., Berkley Rd & Lancaster Ave., Devon, Pa.

X-ray techniques for atomic uses such as work with x-ray diffraction, diffractometer and spectrograph techniques on uranium-aluminum alloys, lattice parameter determinations in studies of the amount of alloy or solid solution, are detailed in four-page Atomic X-ray Techniques Bul — Philips Electronic Instruments, Division of Philips Electronics and Pharmaceutical Industries Corp.

Check 4670 opposite last page.

Quality control and its role in producing lower-cost but better-quality products is subject of Quality Control Booklet—Scientific Apparatus Makers Association.

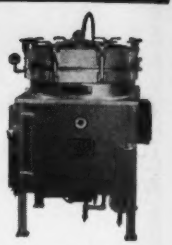
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Fabrication facilities and engineering services available for special process equipment design and production are presented in Cat 30 —Rolock Incorporated.

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For complete oil reclaiming. Removes solids, acids and volatile impurities; moisture, solvents, gases, etc. by heat-vacuum process.

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THAT'S INTERESTING

Scents make cents

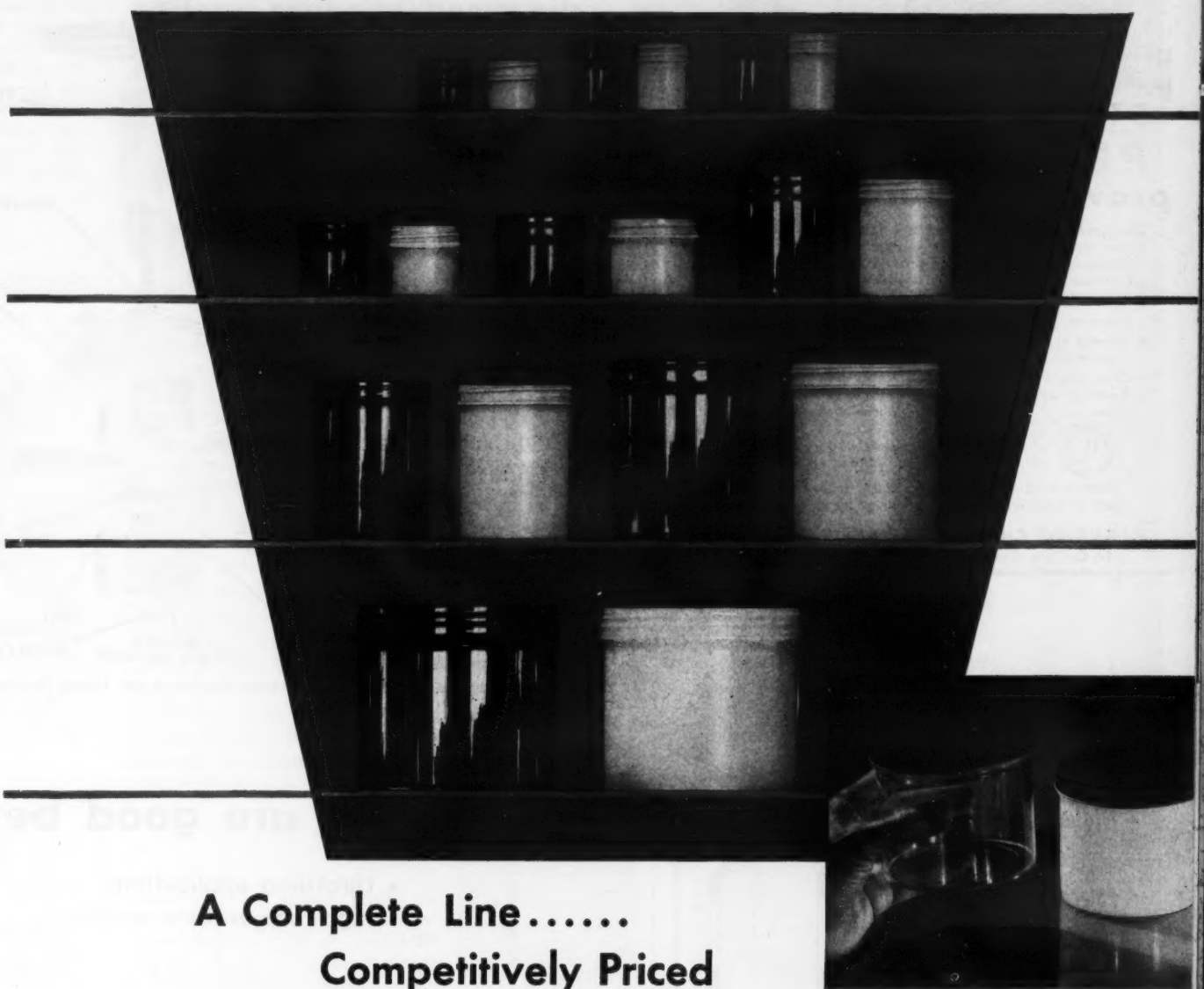
Sales are up 10% as result of using scented polyethylene film in packaging hosiery, says William C. Richter, sales manager for Comette Hosiery Mills, New Braunfels, Texas. Bags are made by Texas Plastics, Inc., using resin supplied by U.S. Industrial Chemicals Company, and perfumed concentrate by Fragrance Process Company, Inc.

Sun-power for auto

A 1912 Baker electric has been adapted to utilize solar energy by International Rectifier Corp. of California. Mounted on roof of vehicle is a 26-sq ft detachable panel which contains 10,000 silicon solar cells. Sunlight energizes electrons in cells which charge car's 72 v battery.

For more information on product at right, specify 4674 see information request blank opposite last page.

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Here's an attractive line of competitively priced jars that weigh about one-fifth the weight of glass jars of equivalent capacity. You benefit **three** ways: **better packaging, less breakage, lower shipping costs.** Write for samples and prices—Address Dept. 505D.

THE NEW 32 OUNCE PLASTIC JAR

This big beautiful 32 ounce jar has all kinds of packaging possibilities in linear polyethylene with overflow capacity of 32.3 fluid ounces—weight 211 pounds per thousand; or clear polystyrene with overflow capacity of 33.8 fluid ounces—weight 212 pounds per thousand. Either jar takes a standard 120 mm closure.

CELLUPLASTIC CORPORATION

24 Commerce St., Newark, N. J.



STOPS LEAKS
PERMANENTLY:
prove it at our expense!

Use *Leak Lock* to seal thread and flange joints...to keep bolts, nuts and plugs from loosening under the most rigorous usage. It's been job-proved in thousands of applications to give these advantages...

- Withstands solvents that eat away other joint compounds.
- Remains flexible indefinitely ...joints won't freeze.
- Gives a tight seal under a wide range of temperatures, pressures.
- Does *not* heat spontaneously.
- Is unaffected by oil, gasoline, refrigerants, most gases and chemicals.
- Makes work easier... flows on and stays where applied.

Listed by Underwriters' Laboratories for gas, oil, propane and butane equipment.

FREE SAMPLE—Leak Lock is available in handy tubes and in cans. Write on your letterhead for sample tube.

HIGHSIDE CHEMICALS INCORPORATED
16 Colfax Avenue • Clifton, New Jersey

Check 4675 opposite last page.

TRY DARCOVA PUMCUPS

FOR

- *Higher pump efficiency*
- *Lower pump maintenance*





Cross-section of the conventional and 45° bevel type Pumcups

Pumcups of various types are available in a complete range of sizes and texture-engineered compositions for your reciprocating pump and cylinder requirements.

IT'S a fact that hundreds of reciprocating pump and cylinder users today are standardizing on Darcova Pumcups because they eliminate fluid slippage, costly down-time and maintenance!

It's easy to check these claims right in your own plant. Behind this exceptional Darcova Pumcup performance lies texture-engineering and cup design that conform precisely to pressure-temperature-fluid conditions.

Why not get *all* the facts? Send today for Pumcup Bulletin No. 5903.

DARLING VALVE & MANUFACTURING CO.
Williamsport 4, Pa.

TRADE MARK PUMCUPS

Check 4676 opposite last page.

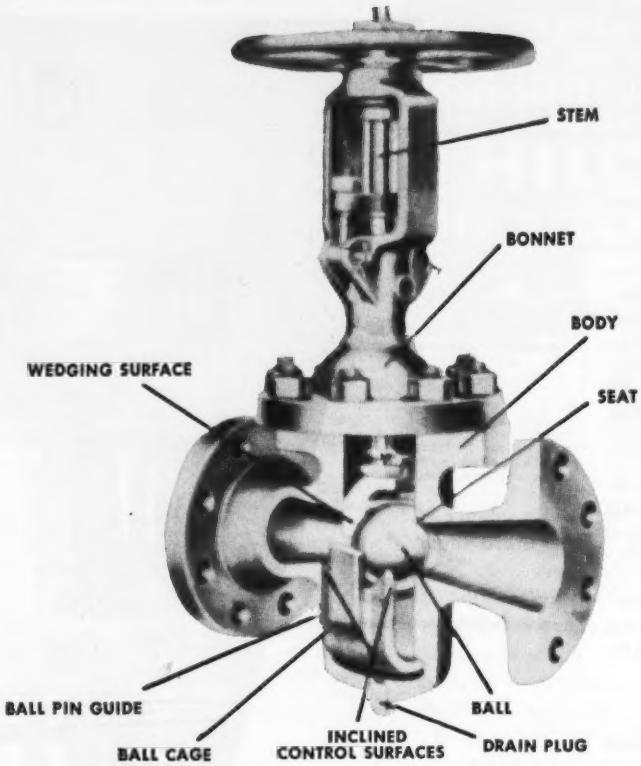


Figure 1 — Paul valve in closed and locked position

A ball valve variation—

Paul valves are good bet for:

- throttling applications
- high-temperature service

A variation on the ball valve (known as the Paul valve) takes up where its famous cousin leaves off — in throttling applications and high-temperature service. As was pointed out in last month's CP report* on the booming application of ball valves, these two areas are the only important Achilles' heels in an otherwise excellent design.

The Paul valve (which incorporates a Venturi non-through-port ball design) thus serves as a complement to its successful relative. This fact is reflected in the sales figures for Paul valves. These have shot up five-fold from $200,000 in 1958 to an expected $1 million level in 1960. The chemical-processing industries' share of this pie is roughly 60%.

Processing men intrigued by the ball concept for use in valves should take a long hard look at the Paul valve. It is available in variety of metals, in sizes of ¼ to 14". Its metal-to-metal seal permits use at high temperatures (−425 to 2200°F.) under severe chemical conditions.

Throttling applications are its forte. Unlike the conventional through-port ball valve, there are no leading edges of an opening to be worn down when the valve is in the partly closed position. Rolling of the ball during each cycle of operation results in uniform wear on the ball, thus not interfering with tight-shut-off characteristics.

*"'Cinderella' ball valves strike it rich in CPI," Aug. CP, p. 34.

The foremost feature of the valve is its high flow capacity. For example, the C_v or flow-coefficient rating for a 10" model is 2000. Because of this characteristic, it is often possible to go to a smaller size Paul valve than would normally be required for another type of valve.

How It Works

The Paul valve is also usable for on-off applications. This can be seen by a study of its operating principle. Fig 1 shows the valve in fully closed and locked position, and identifies basic components.

Wide-open position is illus-

To page 171

WIDE-OPEN

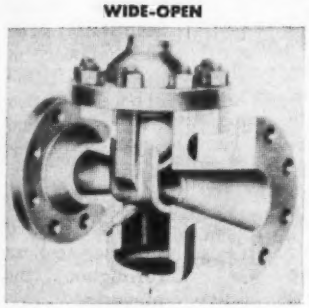


Figure 2

HALF-OPEN

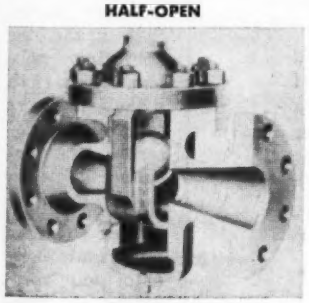


Figure 3

CLOSED

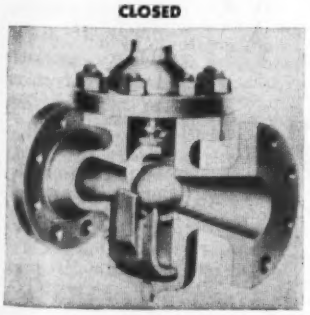
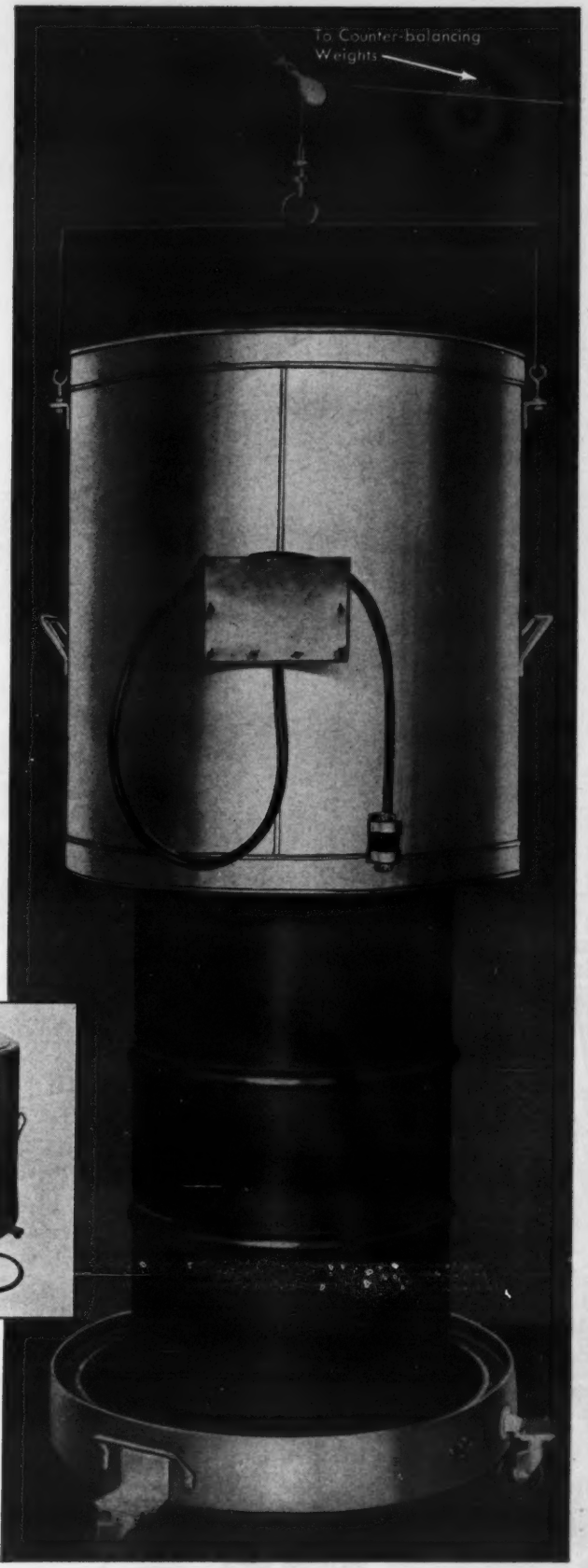


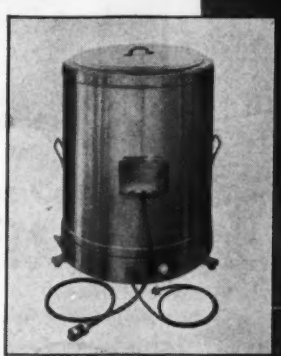
Figure 4

FOR CONTROLLED HEATING of tars, asphalts, heavy oils, greases, paints, varnishes, pitches, resins, plastics, shortening, gelatinous materials

Now! . . the Glas-Col Complete Drum Heater is designed for lifting or lowering by pulleys and counter-balancing weights. One man can easily handle it with one hand! To use, simply place drum on the heater base. Then lower cylindrical part of heater down over the drum. Hook up the two leads. The drum is completely enclosed by the cover, cylindrical and base unit.

Heating elements, embedded in rugged fabric, are close together. This insures uniform input..no local overheating. Accurately controlled temperatures to 550° F can be obtained in base and cylindrical part of the heater by means of separate thermostats. Rugged casters make loaded unit easy to move. The Glas-Col Drum Heater weighs only 95 pounds . . if desired, two men can easily handle it without pulleys and counterweights.





Base part of heater (1800 w, 230 v), **$200.00** . . cylindrical part (6000 w, 230 v), **$340.00** f.o.b., Terre Haute, Indiana. (When ordering, please specify outer diameter of drum chimes. Base or cylindrical unit can be ordered separately.)

Glas-Col Apparatus Company

Dept. CP, 711 Hulman Street
Terre Haute, Indiana

Ask for 4-page descriptive Bulletin DH-100

Check 4677 opposite last page.

ANNIN VALVES

"STAGE CENTER" AT THE 15TH ANNUAL INSTRUMENT-AUTOMATION SHOW

Booth 613

(front and center on the main floor)



. . . the proven answer to complex fluid control problems in the process industries and missile ground support

Always the center of attraction where the newest control valve concepts are sought, ANNIN brings to this year's Instrument-Automation Show new designs . . . new solutions . . . to complex control problems for industry and the military. On display—an improved standard valve line augmented by custom-built electro-hydraulic and pneumatic-hydraulic actuators. For missile and space vehicle ground support, Annin presents for the first time a self-draining valve for storable propellants, and a new vacuum jacketed valve for the control of liquid hydrogen. Check ANNIN first...and discover why no other line of valves and actuators offers so much in design and performance features.

Annin
VALVES

THE ANNIN COMPANY
1040 SOUTH VAIL AVENUE
MONTEBELLO, CALIFORNIA



PROBLEMS?

Interested in solving them?

Want to learn new ways of improving your plant operation and, thereby, realize savings?

In each . . .

issue of CHEMICAL PROCESSING there are articles that will help you solve many of your operational problems.

These "New Solution" stories appear in the "New Solutions" section which begins on page 49 of this issue.

This type of story is featured in other sections throughout the magazine.

They are case history stories that state the operating problem, explain how it was solved, and describe the results obtained.

"New Solution" stories cover all important phases of your operations — processing, safety, maintenance, material handling, packaging, corrosion, to name a few.

For more information on product at left, specify 4678 see information request blank opposite last page.

From page 169

trated in Fig 2. Note that ball cage straddles ball and fluid stream, forming nearly perfect Venturi. In this position, ball is supported by four inclined surfaces on sides of cage. It is held firmly against supports by pressure differential of Bernoulli effect.

As valve is closed (Fig 3 shows half-open position), it rolls into seat, supported by two inclined surfaces and seat. Three-point suspension achieved tends to preclude hammer and give accurate flow control throughout stroke. Pressure differential which holds ball against supports prevents spinning and chattering of ball. Also avoided is settling of suspended matter of fluid in valve body.

When valve is closed (Fig 4), ball centers itself in seat ring. (Valve can handle pressure conditions of high vacuum or 50,000 psi.) Rolling of ball during each opening cycle causes new surface to continually come into contact with seat. Wear that occurs is thus uniform and does not affect tightness of shut-off. If valve is not under pressure, pin-guide directs ball into seat.

(Additional information on P-K Paul valves is tabulated in 14-page Bul GV-101 — General Kinetics Corporation, 197 S. Van Brunt St., Englewood, New Jersey.)

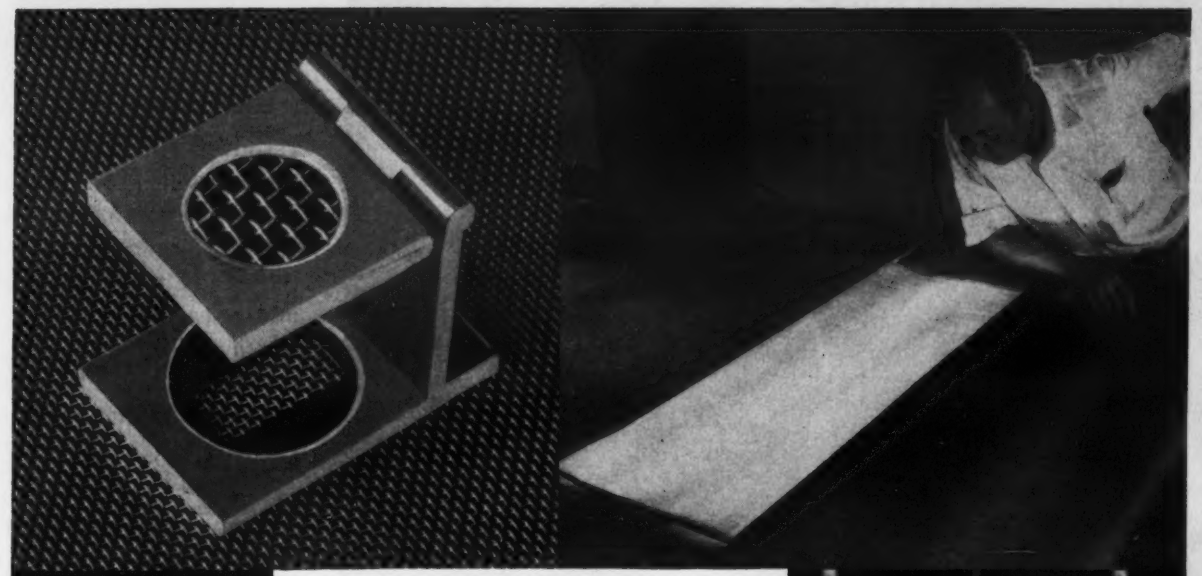
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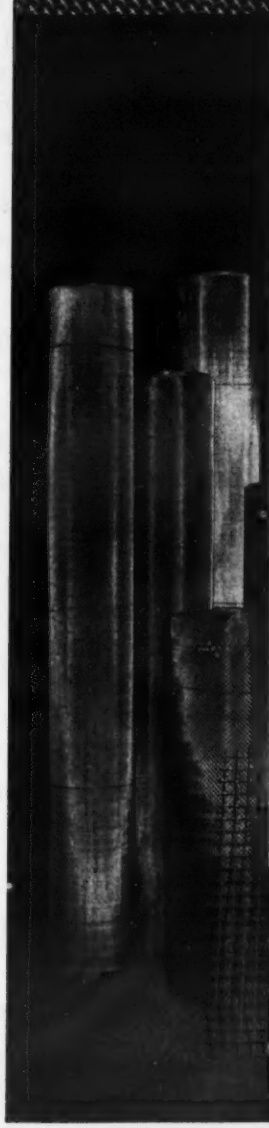
WANTED:

To Keep You Alive

Almost everyone knows of some tricky unexpected danger situation in his plant. CHEMICAL PROCESSING feels that the dissemination of such information to readers is important. Therefore a monthly series on Chemical Boobytraps is now appearing in this section. (See page 78.) If you know of any such situation, please forward an account of it to:

Safety Editor
CHEMICAL PROCESSING
111 E. Delaware Place
Chicago 11, Illinois





Who counts 'em?

CAMBRIDGE does . . .

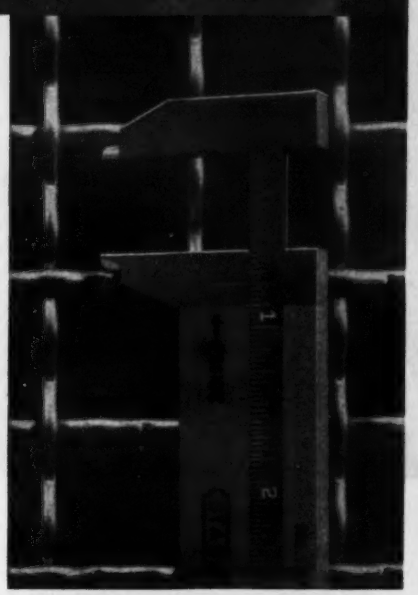
. . . because *exact* mesh count and mesh size are the trademarks of Cambridge INDUSTRIAL WIRE CLOTH.

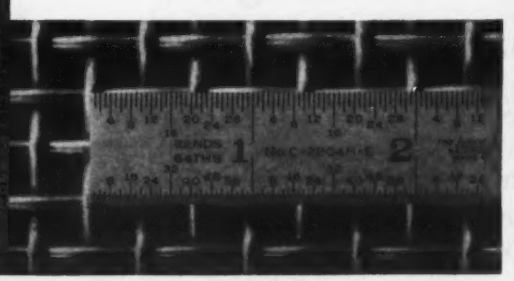
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The Cambridge Wire Cloth Co.

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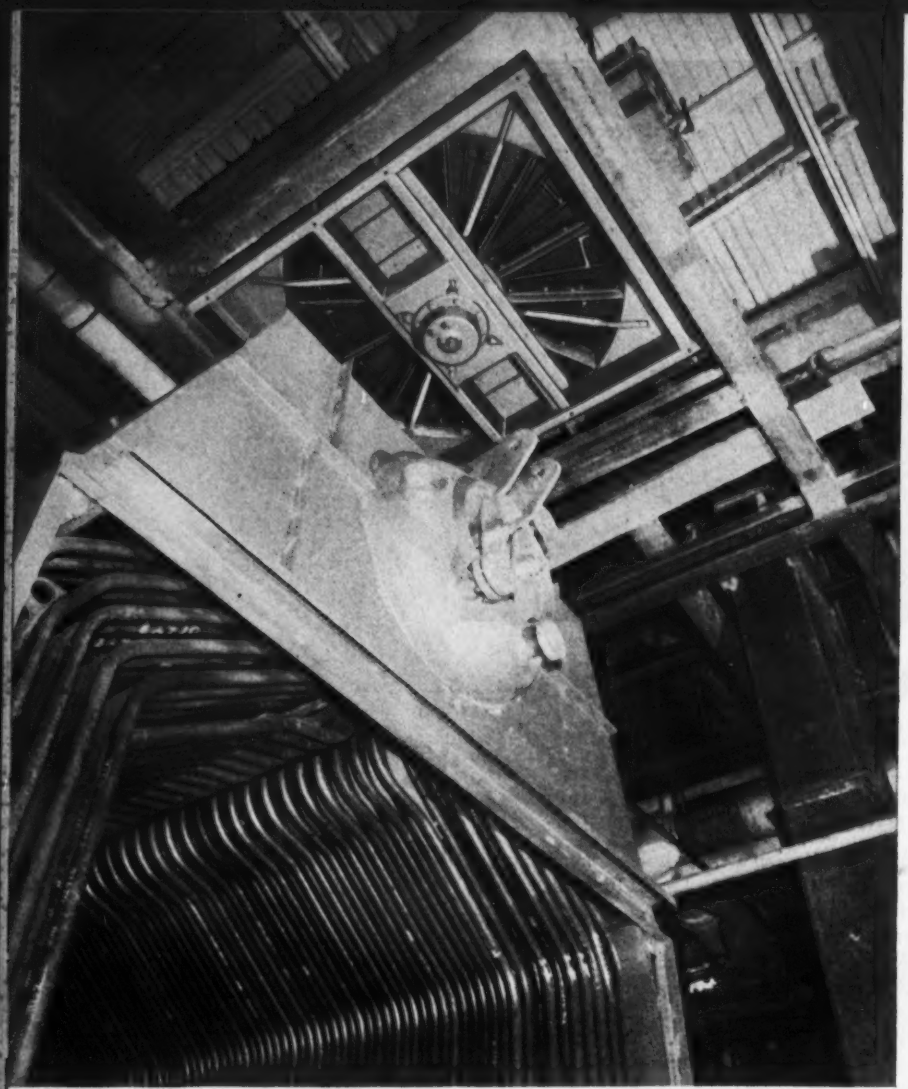
Manufacturers of Wire Cloth, Metal-Mesh Conveyor Belts, Wire Cloth Fabrications







Check 4680 opposite last page.



The Ljungstrom Air Preheater at the B. F. Goodrich Company Shelton Plant is installed directly over the 65,000 lb/hr Wickes boiler. Flue gas leaving the boiler at 615°F passes through the circular rotor, which absorbs the heat and releases it into the incoming air. Preheated combustion air improves combustion, makes fuel burn cleanly. This Package Air Preheater was factory-assembled, and requird only 100 manhours to install.

At B. F. Goodrich Co.'s Shelton Plant

Air Preheater boosts combustion air temperature 345°F... gives 6% more thermal efficiency

"Only a Ljungstrom® Air Preheater, with its continuous regenerative principle, could meet our requirements", says A. G. Sandomirsky, Manager of Engineering at the B. F. Goodrich Company, Shelton, Conn., plant. "We produce foam rubber 24 hours a day, five and six days a week. With an Air Preheater we can meet process steam requirements more economically, and an Air Preheater helped us to justify the installation of high efficiency, high pressure equipment for by-product power generation."

Here's why the Shelton plant meets its requirements best with a Ljungstrom Air Preheater:

1. Ljungstrom is the most efficient heat exchanger you can buy. The Ljungstrom rotor revolves continuously through the flue gas and incoming air, thus absorbing heat and releasing it *from the same surface*. Since the heat doesn't have to pass through anything, each inch of rotor surface is as efficient as one foot of a tubular recuperator.

2. Ljungstrom is the most reliable heat exchanger you can buy. All heat exchange elements pass through the entire air and gas streams. The temperature of the elements in the coolest region – where fresh air enters – is actually an average of the gas and air temperatures, so it's consistently higher than the coolest point in a recuperative heat exchanger. Result: no cold spots, less chance of moisture formation.

3. Ljungstrom is easiest to maintain. You can inspect it – and clean it–while it's running. Heat exchange elements are divided into modular baskets that can be replaced individually without disturbing the other elements. You can even reverse the elements if the surface has thinned on one edge, effectively doubling the life of the heat exchange surface.

For more information on the Ljungstrom continuous regenerative principle, or on the Air Preheater that meets your requirements, phone MUrray Hill 2-8250 or write to The Air Preheater Corporation.

THE AIR PREHEATER CORPORATION

60 East 42nd Street, New York 17, N. Y.

For more information on product at left, specify 4681 see information request blank opposite last page.

STANDS FOR
DEPENDABLE QUALITY
DELIVERY
SERVICE

Wire Cloth—Filter Cloth

Available from stock in all alloys, all weaves, all meshes, up to 244" wide—in rolls or cut to size. "Micromesh" ultrafine strong stainless filter cloth for retention of particles from 25 to 5 microns. Also backing and spacing cloth and screens.

Rescreening Service

On tension rings for vibrating screens.

Neva-Clog

Double layer, perforated, alloy sheet medium—smooth, strong, rigid—for diatomite filters, centrifuges, ion exchangers, carbon towers, dust and fume control.

Filter Leaves

"Rim-Lok" and other Multi-leaves for pressure filters; standard leaves for stationary and rotary filters.



Strainers

"Individualized" strainer elements and housings, designed and built by Multi-Metal to meet process needs not served by available standard units.

Custom Fabrication

Requiring wire cloth elements: screens for filter presses, tubular filter elements, cylinders, baskets, process unit components, etc.



Write for Catalog 57.

MULTI-METAL
WIRE CLOTH CO., INC.
7356 GARRISON AVENUE, NEW YORK 59, N. Y.

Check 4682 opposite last page.

Need a new roof?
—Just spray it on!

Uses: Spray application of roofing to flat and free-form surfaces.

Features: Three-man crew using gun can reportedly install between 15,000 and 18,000 sq ft of roof material per day, compared to only 8000 sq ft with five-man crew utilizing conventional means.

Description: Spray gun installs roof in single operation, rather than building up layers. Gun is used to apply asphalt or other materials and glass fibers simultaneously, resulting in single monolithic film.

In addition to roof applications, gun can be used in construction and application of sidewalls or insulation, sound deadening, pipe coating and corrosive protection.

Gun has three nozzles — one for glass fibers, the other two for coatings. Pump and compressor force coating material through hoses. Hand trigger on gun controls operation. Spray gun can apply formulated emulsions with continuous flow of chopped fibers. These may be combined with number of aggregates including crushed rock, vermiculite, sand, roofing granules, metallic powders and decorative flakes.

(Sealzit spray gun is product of The Flintkote Company, 30 Rockefeller Plaza, New York 20, N.Y.)

Check 4683 opposite last page.

Steam capacity hiked 50% by packed-boiler unit at Goodrich plant

Thermal efficiency upped from 79 to 85%

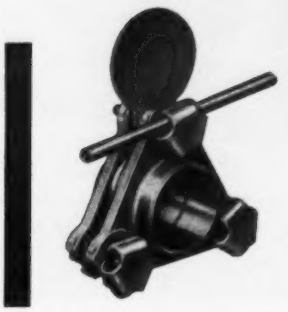
In order to meet increased process-steam requirements, a packaged high-pressure boiler was recently put on line at main plant of Sponge Products Division of B. F. Goodrich in Shelton, Conn. Boiler will generate 65,000 lb of steam per hour, operating at temperature of 750°F and pressure of 650 psi. This represents 50% increase in steam-



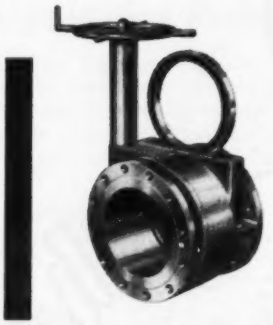
FAST, EASY, POSITIVE LINE BLINDING

Hamer Line Blind Valves





The famous 3-Bolt Hamer Line Blind Valve has set the standard for positive, dependable, economical line blinding in all industries.



Handwheel operated Hamer Rigid Type Line Blind Valves are ideal for installation where conditions prevent spreading the line to reverse the spectacle plate.

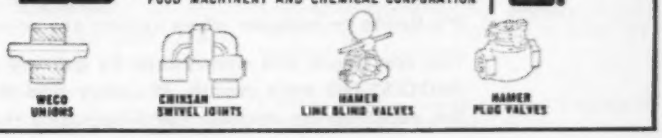
FAST . . . because one man can reverse the spectacle plate from open to closed position in a matter of minutes.

EASY . . . because bar or handwheel operation provides tremendous leverage for spreading and tightening the hubs that hold the spectacle plate. Wedges, hammers, wrenches needed for spreading conventional flanges are eliminated.

POSITIVE . . . because nothing seals as securely and permanently as the solid spectacle plate clamped between the hubs of a Hamer Line Blind Valve.

Ask your nearest Hamer Line Blind Valve specialist about the multiple advantages of installing them wherever positive line shut-off is essential. Write for new Hamer Valve Catalog 60.

WECO
WELL EQUIPMENT MFG. CORP.
HOUSTON, TEXAS
Division of CHIKSAN COMPANY a subsidiary of FOOD MACHINERY AND CHEMICAL CORPORATION
HV-2-60
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Check 4684 opposite last page.

THROTTLABLE PLASTIC GATE VALVE AV[illegible]YPROPYLENE·STOP· PENTON

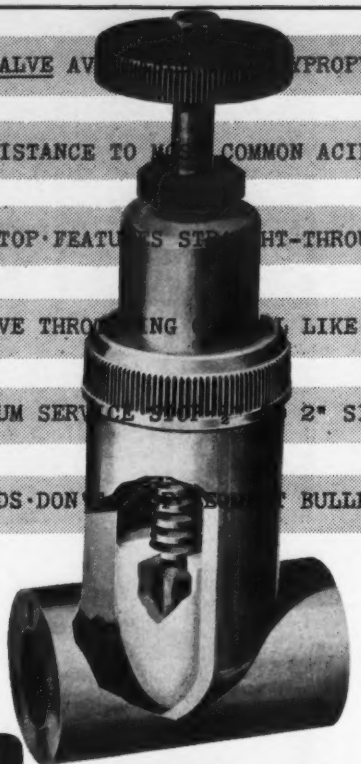
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AT ELEVATED TEMPERATURES·STOP·FEATU[illegible]S STR[illegible]HT-THROUGH NO-PRESSURE-DROP

FLOW WITH CLOSE AND POSITIVE THRO[illegible]NG [illegible] LIKE GLOBE VALVE·STOP·

RATED FOR 150 LBS AND VACUUM SERV[illegible] 2" SIZES WITH SOCKET

WELD FLANGED OR SCREWED ENDS·DON[illegible] BULLETIN 42A



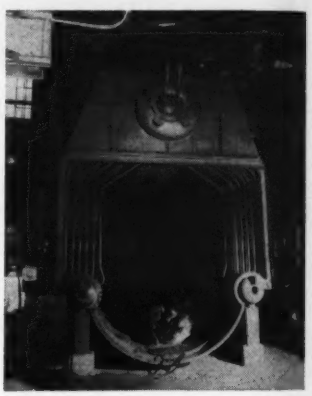
Vanton PUMP & EQUIPMENT CORP. DIVISION OF COOPER ALLOY CORP., HILLSIDE, N. J.

Check 4685 opposite last page.

generation power for plant.

Plant requires reliable economical steam power for curing foam rubber. Because process is continuous, reliability of power plant was primary factor in selecting packaged air preheater for installation. Preheater was installed in approximately 80 manhours.

Air preheater was designed to recover 300° of heat from gases leaving boiler at approximately 700°F. As result,



Packaged high-pressure boiler will generate 65,000 lb of steam per hour, operating at temperature of 750°F and pressure of 650 psi. Packaged air preheater (top) is designed to recover 300° of heat from gases leaving boiler at approximately 700°F

roughly 80,000 lb/hr of air enters air preheater and leaves at 425°F. Overhaul thermal efficiency of power plant has been increased from 79 to 85%.

(Packaged boiler is product of Wickes Boiler Company, 519 N. Washington, Saginaw, Mich.)

Check 4686 opposite last page.

(Ljungstrom® air preheater is product of The Air Preheater Corporation, Wellsville, N.Y.)

Check 4687 opposite last page.



WHO SWIPED PAGE 43 ?

D'ja ever pick up a copy of CHEMICAL PROCESSING with an article torn out . . . or even worse, HALF an article torn out?

It's liable to happen when copies are routed around your plant.

You can avoid this annoyance by getting your own copy of CHEMICAL PROCESSING each month. It's easy and there is no charge. Just fill in the subscription request form opposite the inside back cover.

Cryogenic-gases physical properties are tabulated on both wallet-size and full-sheet cards. Information includes boiling points, critical points, triple points, specific heats and densities of most gases ranging from acetylene to xenon. Cryogenic Gases Chart and Card—Air Products, Inc.

Check 4688 opposite last page.

THAT'S INTERESTING

Skyscraper Butyl-based

Humble Oil & Refining company's new 44-story office building will stand on a black carpet of Butyl rubber when it is completed in 1962. The Butyl sheeting installed 60′ below surface of the ground serves as water barrier.

Short mums

By mixing Phosfon powder in the soil when planting young chrysanthemums gardeners can obtain mums with standard size flowers but shorter stems.

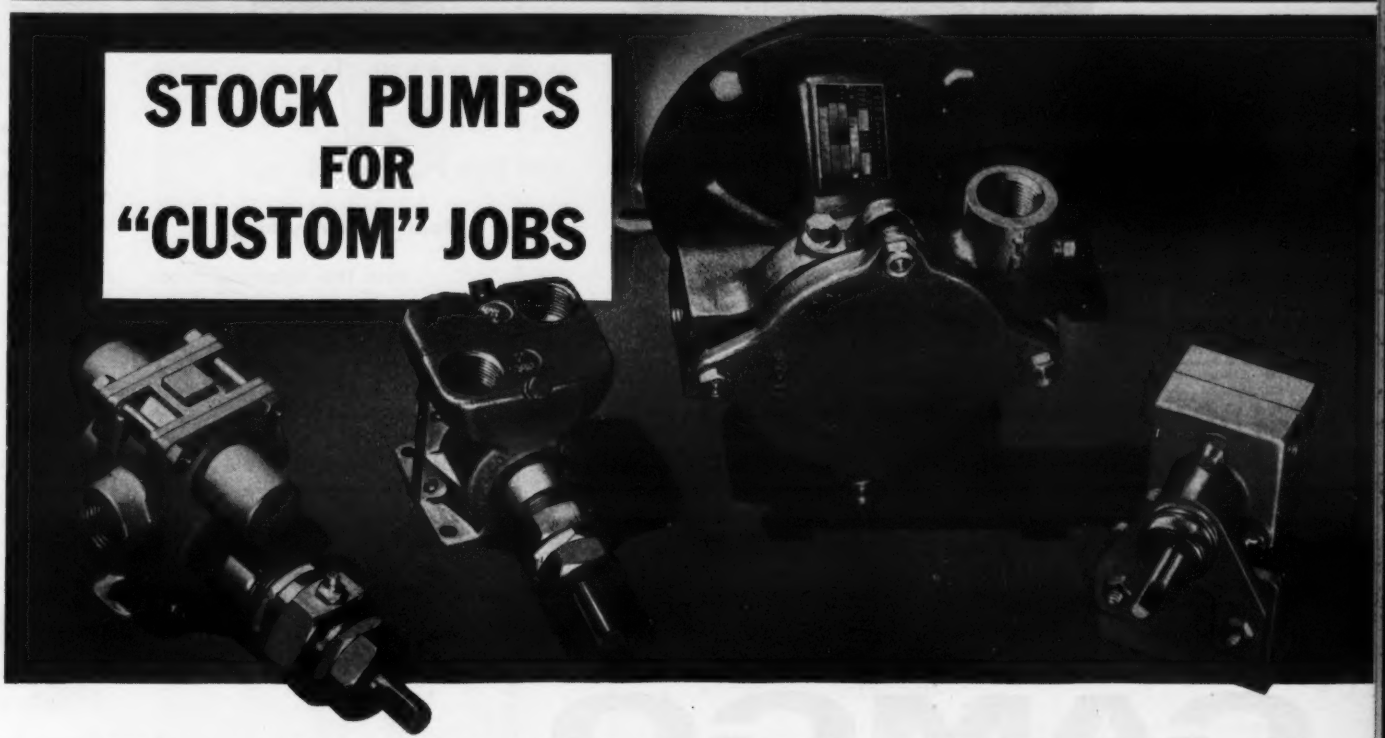
Re-usable rockets

Rocket engine booster systems for space vehicles and missiles could be recovered and re-used, V. R. Larson and D. S. Hirshfield of Rocketdyne, claim. Laboratory tests using simulated conditions are basis of claim.

For more information on product at right, specify 4689 see information request blank opposite last page.

ECO ENGINEERING NEWS

the big name in small pumps for the process industries



STOCK PUMPS FOR "CUSTOM" JOBS

Widest Variety of Metals and Non-Metallics For Every Corrosion and Contamination Problem

Only in high priced, slow delivery "custom built" pumps are you able to secure anything approaching the variety of special metals and non-metallics offered in the Eco line of standard, stock, Chemical Pumps. Reason for the great versatility of these pumps in meeting the requirements of all commercial chemicals, acids, oxidants, alkalies, aromatics and solvents, including the most reactant and hazardous fluids.

Metals used in Eco Pumps embrace the stainless steels 304, 316 and Carpenter 20; Stellite*, Hastelloy* B and C, monel, nickel, zirconium and titanium. Non-metallics include Teflon†, phenolic plastic resins, Hypalon†, Nylon, Penton‡, ceramic, carbon, etc.

Complete Interchangeability of Parts

Precision uniformity in manufacture permits complete interchangeability of parts, allowing unlimited combinations of housing and trim materials to exactly meet customer's requirements and to facilitate field servicing or conversion of pumps to new services.

Mass Produced and Stocked for Quick Delivery

Eco Pumps are produced in volume on automatic "program" machine tools of advanced design, where multiple operations are performed to reduce needless labor and handling. This results in lower prices to the user.

It also insures at all times, a large stock of complete pumps and part sets ready for immediate delivery.

It will pay you, as it has many others, to standardize on Eco for all small chemical pump requirements. Write for literature on the complete Eco line.

GEARCHEM®: If you require self-priming and intermittent or sustained operation with constant flow metering and reproducible accuracy within ± one per cent, depending on viscosity—select the Eco GEARCHEM Pump. For temperatures to 400°F, viscosities to 10,000 SSU, capacities to 10 gpm, pressures to 100 psi.

ALL-CHEM®: If you want linear, non-segmented, non-foaming flows, ideal for shear sensitive emulsions and safe for auto-detonating fluids—select the Eco ALL-CHEM Rotary positive displacement pump. For reduced viscosities and temperatures to 250°F, capacities to 10 gpm, pressures to 75 psi.

CENTRI-CHEM®: If you want a widely applicable centrifugal pump handling most chemicals including slurries with particle size up to 1/16", as well as troublesome sticky fluids—select the Eco CENTRI-CHEM. Capacities to 40 gpm, heads to 57 ft.

MINILAB®: If you want an all-purpose laboratory and pilot plant pump to handle severe corrosives, 'round the clock—select the Eco MINILAB. Capacities from 0 to 2 gpm, pressures to 100 psi. Reversible, self-priming. Yields linear flow ideal for constant flow metering.

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LOW COST
light weight
FORGED
carbon steel

NOM. I. P. S.
1/2" thru 8"

back-up flanges
CAMCO

FOR USE WITH SCHEDULE 5 and SCHEDULE 10 STAINLESS STEEL STUB ENDS and PIPE

Can be used with slip-on or lap joint stub ends where pressure and temperature problems are not encountered and Stainless is utilized to avoid contamination or corrosion.
Flange surfaces protected with a baked enamel finish.

THE Quality LINE IN FITTINGS
CAMCO
FITTINGS, INC.
301 STATE STREET
NORTH HAVEN, CONNECTICUT

For prices and dimensional data send for Schedule FCS-460



Check 4690 opposite last page.

Safety Slants



Face-up to anything

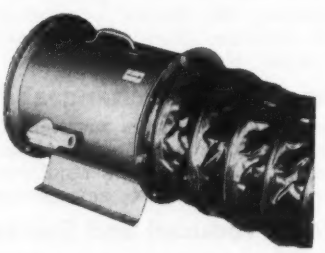
. . . with this lightweight face shield. Shield weighs 3-¼ oz complete with 6 x 11-½" x 0.02" window. Head band is made of pliable polyethylene. Vulcanized-fiber deflector will accommodate even largest spectacle frames. Window-deflector section pivots easily and remains secure in any working position on friction joints.

(Feather-Lite F-90 face shield is product of The Fibre-Metal Products Company, 5th & Tilghman Sts., Chester, Pa.)

Check 4691 opposite last page.

Hazard measurement, detection, correction and litigation, of casualty, fire, pollution and product-liability, are reviewed in eight-page booklet, which discusses prevention of such hazards by means of plant appraisals, precautionary labeling, and toxicological testing, among other methods. "Hazards" —Foster D. Snell, Inc.

Check 4692 opposite last page.



Foil for air

. . . with portable ventilators for exhausting fumes or circulating air in areas where permanent installations are impractical or unfeasible.

Units combine portable fan with lengths of flexible duct. Construction details include safety guards and carrying handles, heavy gage-steel housings with reinforced flanges, and wire-reinforced flexible duct that mounts on fan flanges or snaps onto other duct sections. One 16" and two 12" diam models are available from stock.

(Ventilators PT are product of Propellair Division, Robbins & Myers, Inc., Springfield, Ohio.)

Check 4693 opposite last page.



Gas-cylinder support

. . . holds cylinder rigidly in place on edge of lab bench or table with simple bracket clamp. Convenience is afforded because it can be set-up easily on most table edges and adjusted to any standard-size cylinder.

(Gas-cylinder support bracket is product of Central Scientific Co., 1700 Irving Park Rd., Chicago, Ill.)

Check 4694 opposite last page.

Gas-leak privacy

. . . is successfully invaded by use of detector liquid. High-viscosity substance forms bubbles when daubed on pipe joints where leakage exists.

Detector leaves no deposit and is harmless to skin. Non-staining liquid can be used without danger of fire. Non-freezing, it functions efficiently with any compressed gas.

Leak detector is available packed in six-oz unbreakable plastic bottles with stainless dauber rod.

(Gas-leak detector is product of Jobber Sales Division, Calgon Company, Hagan Center, Pittsburgh 30, Pa.)

Check 4695 opposite last page.

Radioactivity levels and environment data are given in first issue of new monthly technical publication. Included in initial issue are data on radiation levels in air, water and milk for the most part. Publication is outgrowth of directive by President last August that the Department of Health, Education and Welfare "intensify its radiological health efforts and have primary responsibility within the executive branch for collation, analysis, and interpretation of data on environmental radiation levels." Price of publication is 50¢ per single issue and $3.00 for a six-month subscription. Single issue, and subscription orders and/or further information may be obtained from Office of Technical Services, U.S. Department of Commerce, Washington 25, D.C.

Safe use of flammable materials in spray finishing is subject of revised-standard 44-page pamphlet which incorporates new information on storage and handling of organic peroxides.

Other new provisions are requirements relating to pipe systems containing flammable liquids for spray-finishing operations. Copies of "Spray Finishing" are available at $0.50 per copy from National Fire Protection Association, 60 Batterymarch St., Boston 10, Mass.



It's time something was done . . . order some buckets!"

Mark Larkin, Electra Mfg. Co.

RAYMOND

In World-Wide Use for Half a Century

ROLLER MILLS

THE standardized use of Raymond Roller Mills in so many industries comes as a natural result of these advantages:

1. Ability to pulverize an extremely wide range of products and to handle various types of raw materials from mines, pits, quarries and bed deposits in all parts of the world.

2. Removal of surface moisture from the material while grinding to insure a fine, dry, free-flowing product.

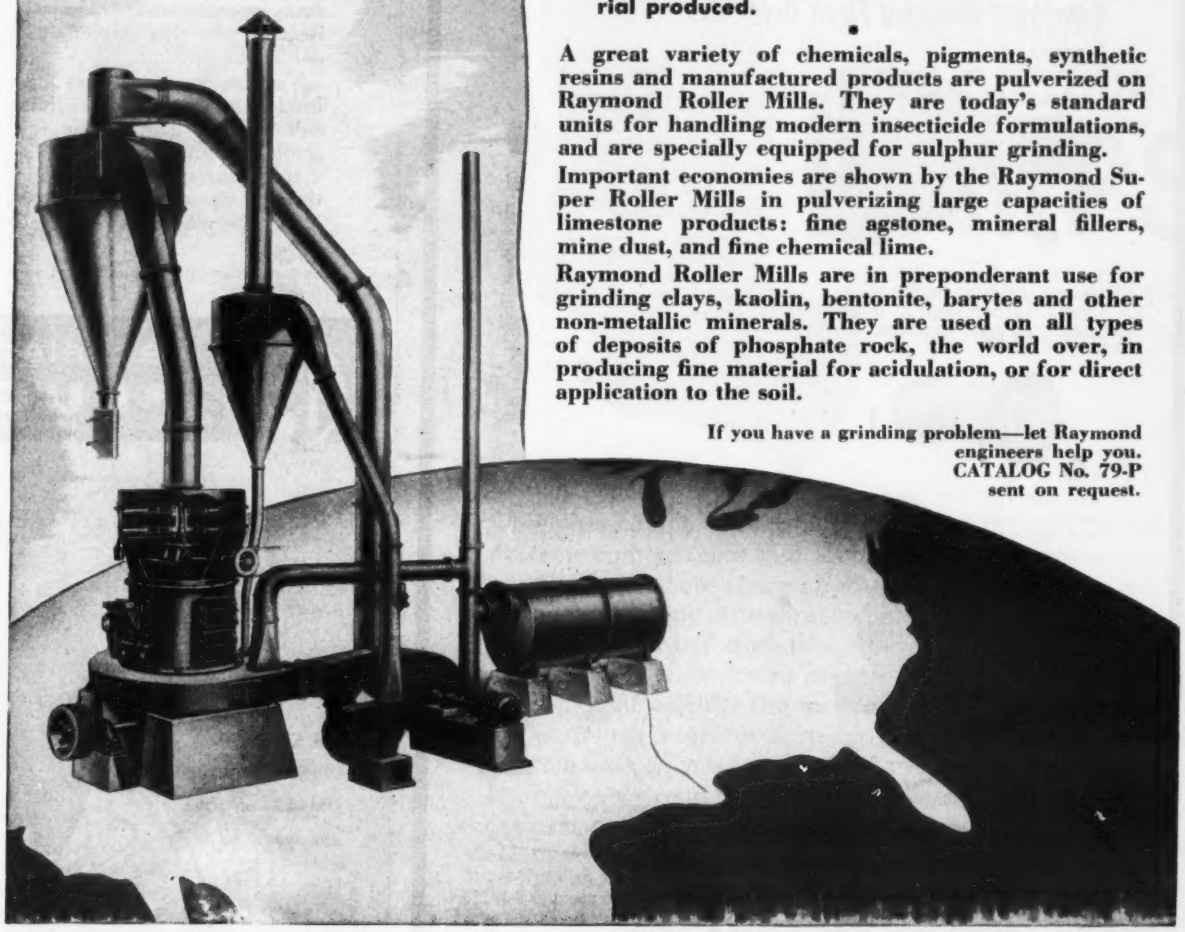
3. Automatic dust-free operation with record low costs for maintenance and power per ton material produced.

A great variety of chemicals, pigments, synthetic resins and manufactured products are pulverized on Raymond Roller Mills. They are today's standard units for handling modern insecticide formulations, and are specially equipped for sulphur grinding.

Important economies are shown by the Raymond Super Roller Mills in pulverizing large capacities of limestone products: fine agstone, mineral fillers, mine dust, and fine chemical lime.

Raymond Roller Mills are in preponderant use for grinding clays, kaolin, bentonite, barytes and other non-metallic minerals. They are used on all types of deposits of phosphate rock, the world over, in producing fine material for acidulation, or for direct application to the soil.

If you have a grinding problem—let Raymond engineers help you.
CATALOG No. 79-P sent on request.



COMBUSTION ENGINEERING, INC.
Raymond Division
427 W. RANDOLPH ST.
CHICAGO 6, ILLINOIS
SALES OFFICES IN PRINCIPAL CITIES
Combustion Engineering-Superheater Ltd., Montreal, Canada

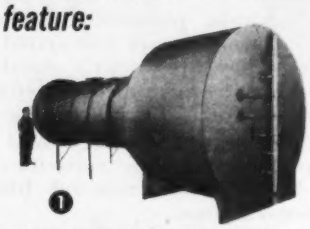
Check 4696 opposite last page.

EDW. RENNEBURG & SONS CO.

Flash Dryers

. . . designed for processing light, fluffy materials—Renneburg Flash Dryers process fine wood fibres, filter cakes, sewage sludge and other types of particulate solids, which can be pneumatically conveyed at high velocities in a warm air stream to remove moisture.

Renneburg-designed Flash Dryer Systems feature:



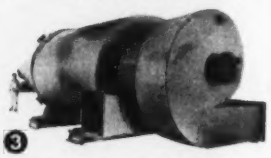
❶ Refractoryless Furnace—eliminates refractory cost and periodic maintenance . . . lighter in weight . . . requires smaller, less costly foundation.



❹ Advanced Instrumentation with flame safety and explosion protection features . . . assures positive control of drying conditions.



❷ Air-Cooled Feed Duct Economizer—permits recovery of heat radiated from inner feed duct . . . preheats secondary air flowing into furnace.



❸ Cyclone Collector with helical type air inlet and scroll type outlet . . . provides greater collection efficiency with lowest pressure drop, resulting in less power consumption.

Flash Dryer System shown in drawing has approximately 250 feet of ductwork. Material is dried in less than 6 seconds.

Literature and information on request

EDW. RENNEBURG & SONS CO.
2639 Boston Street, Baltimore 24, Md.
Serving the Process Industries for over 85 years
Renneburg Research & Development Center — 2635 Boston St., Baltimore 24, Md.

Check 4697 opposite last page.

Chemical Boobytraps

Unsuspected hazards awaiting the unwary

Sloppy practice negates careful ether inerting

A flash fire and thud recently occurred at flanged opening of reactor containing ether slurry with nitrogen blanket. Fortunately, there was no resulting damage and no one was injured.

Reactor was being prepared for introduction of sodium sulfate from hopper. The blind flange cover (over six-inch-diam opening) was removed. Reactor was then placed under slight vacuum.

Vacuum on reactor was utilized to ease flow of sodium sulfate from hopper into reactor. Vacuum drew approximately four to six cfpm of air through opening into reactor.

As operator was lowering four-inch-diam funnel of hopper into reactor opening, he heard thud. Sliding gate on hopper had not yet been opened to allow chemical to flow from hopper into reactor. Operator then observed that rubber sleeve around funnel was scorched.

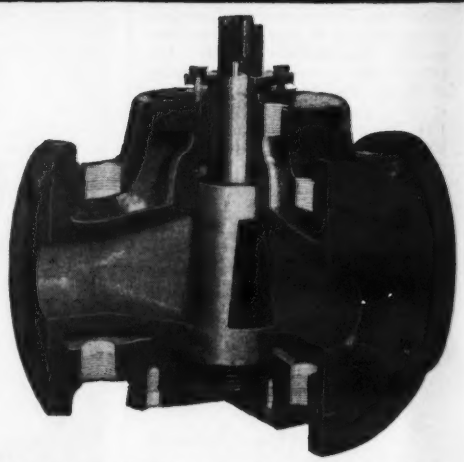
At time of above incident, water coolant flowing around top of stuffing box on agitator bearing was steaming. Following thud, hose stream was played on bearing and packing box and steaming again was observed. Flange cover was replaced immediately and nitrogen admitted to reactor.

It is assumed that a minor explosion occurred at opening to reactor when air was drawn into reactor, mixed in proper proportion with ether to be

H&B ESTABLISHED 1887

Jacketed Spring Loaded
PLUG VALVES

- **2-WAY OR STRAIGHT SPRING LOADED**
- **3-WAY SPRING LOADED**
- **ANGLE SPRING LOADED**
- **AIR CYLINDER OPERATED SPRING LOADED—*all sizes and types***



LONG ON SERVICE . . . SHORT ON MAINTENANCE

H & B's new fully jacketed spring loaded plug valves feature an inverted tapered plug inserted and lapped into the housing from the bottom of the valve—then spring loaded. The spring wedges the plug to a perfectly tight seal, eliminating troublesome leaks. Easy to operate—no big handwheel . . . no freeze . . . no "breaking loose" necessary. Easy to clean. Made in two port or multi port design, with any special stop arrangement desired.

Bulletin J-57 sent on request

HETHERINGTON & BERNER INC., 747 Kentucky Ave., Indianapolis 7, In

Check 4698 opposite last page.

ignited by hot agitator bearing.

Following precautions will be taken to prevent recurrence in future:

1) Agitator bearing and stuffing box will be overhauled weekly instead of biweekly.
2) Thermocouple temperature gage has already been installed on stuffing box. Should temperature reach 50°C, agitator will be stopped and stuffing box and bearing overhauled.
3) Hopper funnel will be equipped with flexible hose and flange which will permit tight connection to reactor. This flexible hose will be jumpered with static ground wire.
4) Vacuum on reactor will be turned on only after hopper is bolted into place.
5) Portion of sodium sulfate will be left in bottom of hopper when gate on funnel is closed to prevent entrance of any outside air.
6) Vacuum will be turned over before hopper is disconnected and flange cover replaced on reactor.

(Contributed by Earl R. Wallace, Senior Safety Engineer, Eastman Kodak Company, Kodak Park Works, Rochester 4, NewYork.)

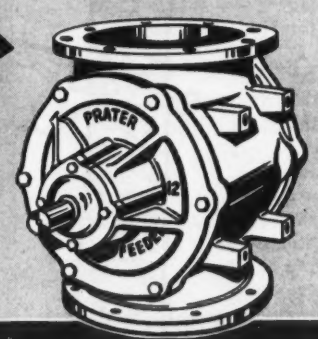
Ammonium-nitrate behavior under fire conditions is discussed in 16-page pamphlet citing tests which indicate that both high pressures and high temperatures are required prior to ammonium-nitrate explosion under fire conditions. Copies of "Ammonium Nitrate — Behavior in Fires" are available at 25¢ each from National Fire Protection Association, 60 Batterymarch St., Boston 10, Mass.

PRATER
ROTARY AIRLOCK FEEDERS
for
DUST CONTROL and PNEUMATIC CONVEYING

Write for "How to Select A Rotary Airlock Feeder" Bulletin P58



the recognized LEADER



FOREMOST BUILDERS OF ROTARY AIRLOCKS

PRATER PULVERIZER COMPANY
1513 South 55th Court — Chicago 50, Illinois

Check 4699 opposite last page.

SAVE SPACE and REDUCE COSTS with AURORA® VERTICAL END-SUCTION PUMPS



Capacities to 1800 GPM
Heads to 320 Feet

This close-couple, vertical mounting design provides the extreme compactness that is so important for the many applications where space allocation is critical. Flanged suction mounting cuts piping costs by direct mounting to tank. Separate foundation arrangement is eliminated along with any alignment problems. Optional discharge arrangement permits the most simplified installation.

The many desirable features of the Horizontal End Suction Pumps are retained . . . motor and rotary assembly easily removable without disturbing the suction or discharge piping . . . low NPSH . . . smooth quiet operation. Available in vertical base mounting design as well as close coupled or flexible coupled horizontal models.

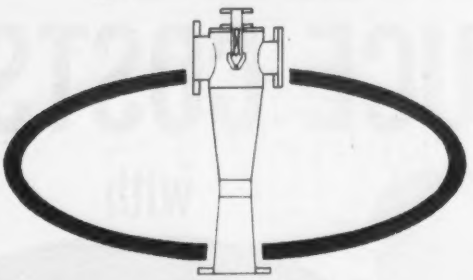
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AURORA Always PUMPS

AURORA PUMP DIVISION
THE NEW YORK AIR BRAKE COMPANY
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LOCAL DISTRIBUTOR IS LISTED IN THE YELLOW PAGES OF YOUR PHONE BOOK

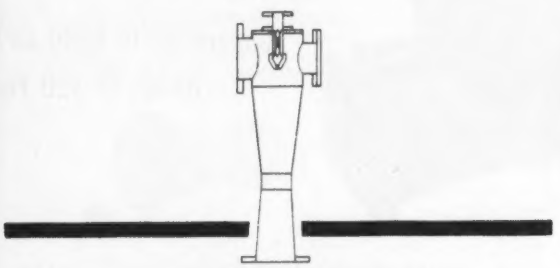
Check 4700 opposite last page.

CROLL-REYNOLDS
Jet-Venturi



Fume Scrubbers

minimize odors
clean and purify air
and other gases
without fan or blower



ADDITIONAL APPLICATIONS

to recover valuable solids
use as Jet Reactors

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Main Office: 751 Central Avenue, Westfield, N. J.
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FUME SCRUBBERS • SPECIAL JET APPARATUS

Check 4701 opposite last page.

Cold-water quenching @ 1350°F bodes no ill for ductile-iron pumps

Two types are available: single- and multi-stage

Uses: Intermediate-range pump service.

Features: Pumps are cast in ductile iron. These cases were heated to temperatures in excess of 1350°F and subjected to cold-water quenching. Not only did ductile iron withstand these extreme temperature changes without breaking, but they also retained their exact original temperatures.

Description: Ductile-iron pumps are available in single- and multi-stage horizontal models. Continuous-duty single-stage types are available in sizes of four inches and larger, with capacities to 60,000 gpm and heads to 400′. All types of drives are available for this series.

Multi-stage pump is available in two-, three-, four- or five-stage designs. This series has heads to 1500′ and capacities to 3000 gpm.

(Ductile iron pumps are reviewed in Bul B-1314 — Peerless Pump Hydrodynamics Division, Food Machinery and Chemical Corporation, 2005 Northwestern Ave., Indianapolis, Ind.)

Check 4702 opposite last page.

Alloy choice no problem in ball-valve line

A recent entry in growing ball-valve field is designed for use to 1000 psig and 400°F. Steel valves are developed for use with steam gases, oil, abrasive media, slurries and corrosives.

Available in variety of alloy body materials, valves are produced with screwed ends in sizes of ¼ to 2″ and with flanged ends in sizes of ½ to 10″. These valves, have quarterturn action and solid-Teflon stem packing.

(Ball-valve line is explained in Cat BV-60—Pacific Valves, Inc.)

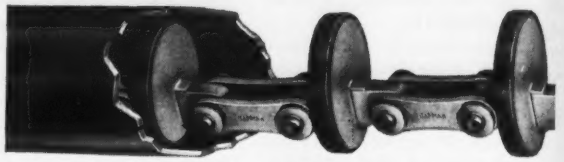
Check 4703 opposite last page.

Hapman Conveyors

offer you these outstanding features for your flowable material:

• Completely flexible • Compact • Self-cleaning
• Self-supporting • Self-feeding • Dust, odor-tight

almost always



cost more

. . . but return their cost many times. Sound engineering, superior materials and workmanship go into every Hapman installation. With Hapman tubular conveyors you have minimum wear, minimum degradation, and maximum trouble-free performance. This is why you may pay more initially, but with Hapman you can be sure of the best conveying system . . . and save in the long run.

For Fact-Finding Report on Hapman Conveyors, write today to:

Dept. CP-9

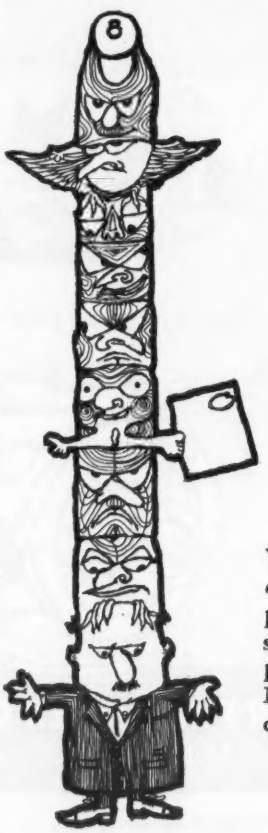
Conveyor Division

HAPMAN

HAPMAN CORPORATION

630 Gibson St. • Kalamazoo 6, Mich.

Check 4704 opposite last page.



are you the low man on the totem-pole?

. . . always last to receive CHEMICAL PROCESSING?

You needn't be. To get your *own* copy, addressed to you personally, fill out the subscription request form opposite the inside back cover. No charge, of course, if you qualify.

DATA SAVERS!

CP's Processing and Engineering Data Section is for you!

Each month, this section contains time-saving nomographs, tables, or charts which other data savers have found extremely useful in speeding calculations. They have been sent to us by our many readers.

Perhaps, you will find them to be of value to you.

A wide variety of information can be found in this section. So, no matter what your particular field you will find suitable data to aid you in your daily work.

And —

the section pages are designed to fit easily into regular data files.

Keep them handy for use in making quick calculations in the plant or office.

Just cut along the marked edge, punch as indicated, and insert them into your notebook.

So —

be sure not to miss this month's "Data Section." It begins on page 63.

For more information on product at right, specify 4705 see information request blank opposite last page.

CARBORUNDUM'S TECHNICAL INFORMATION ON ELECTRIC HEATING

Data sheet

PROTECTIVE ATMOSPHERE HEATING

with silicon carbide elements

For heating operations requiring special atmospheres, furnaces equipped with silicon carbide elements offer particular advantages. This radiant electric heat is clean, efficient, and gives accurate temperature control. There are no exhaust gases and combustion fumes . . . no fire or explosion hazards to consider.

Some atmospheres, such as argon and helium, are actually conducive to good element life. Others may tend to affect element performance somewhat. In those instances, our engineering staff will gladly offer usage recommendations. Moreover, if you adhere to the operating temperatures and watt loadings shown in chart on right, the silicon carbide elements will give long, troublefree service.

Advantages often offset fuel cost differentials

GLOBAR® silicon carbide elements for heating in oxidizing or reducing atmosphere offer greater economy than is indicated by a simple comparison of fuel and electricity costs. Some of these advantages are:

- *Rod type elements simplify furnace design.*
- *Maintenance is reduced and servicing made easy.*
- *No exhaust gases or combustion fumes and lower heat loss mean cooler, safer working conditions.*
- *Elements quickly removed and replaced from outside the furnace. No need to cool the chamber and hold up production.*
- *Temperatures accurately controlled.*
- *Elements can be operated continuously or intermittently in oxidizing or protective atmospheres.*
- *"On line" operation can be used in many applications, thus eliminating the cost of transformers.*

For the full facts on heating with GLOBAR silicon carbide elements, call Carborundum or an experienced electric furnace builder.

Typical applications of GLOBAR® silicon carbide heating elements

Annealing, sintering, brazing and heat treating of metals
Firing ceramics
Calcining powders and magnetic materials
Roasting fluorescent oxides
Firing of porcelain enamel
Reduction of oxides
Subliming molybdic oxide
Production of magnesium



GLOBAR silicon carbide heating elements are available from large stocks, or can be supplied within 2 weeks if manufacture is necessary. Sizes range from ½" to 2⅛" in diameter and from 4" to 105" in length. Elements are matched to meet your requirements.

MAXIMUM WATT LOADING OF GLOBAR® ELECTRIC HEATING ELEMENTS IN RELATION TO FURNACE CHAMBER TEMPERATURE

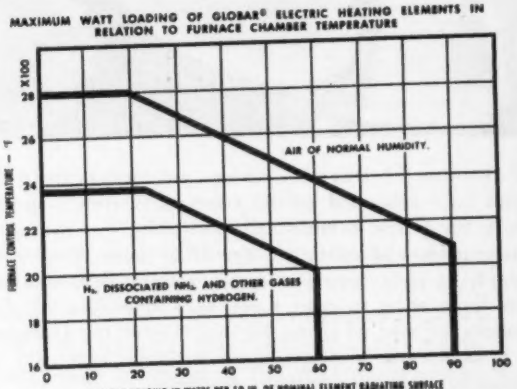
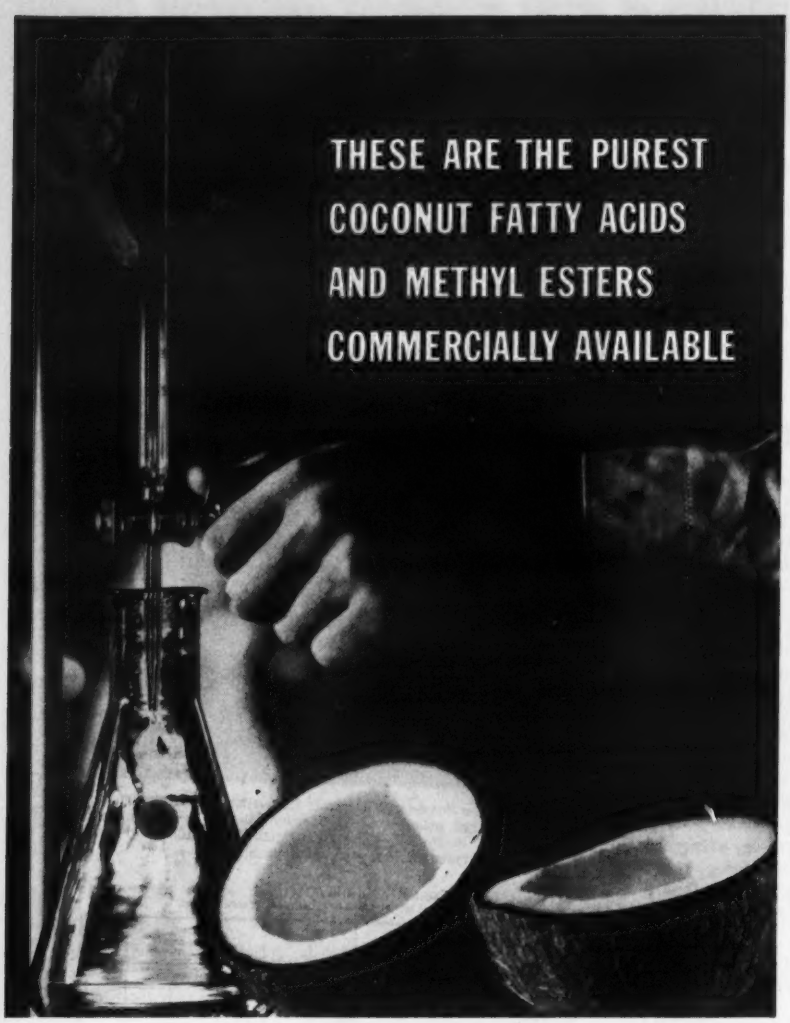


Chart above indicates recommended maximum temperatures and watt loadings for GLOBAR silicon carbide elements. Upper curve covers atmospheres of air, compositions of oxygen, carbon dioxide, argon or helium. Lower curve covers atmospheres of hydrogen, nitrogen or compositions containing carbon monoxide.



Write today for your free copy of our technical "Bulletin H" describing physical and electrical characteristics of GLOBAR elements. The address: Dept. CP-90, Globar Plant, Refractories Division, Carborundum Co., Niagara Falls, New York.

For latest advances in silicon carbide heating elements . . . count on **CARBORUNDUM®**



At Foremost-El Dorado, where we concentrate on manufacturing coconut fatty acids and methyl esters exclusively — purity is foremost. We produce the purest commercially available. For example, our Lauric and Myristic acids and esters are over 98% pure. More important, these high standards of purity are constantly uniform. Reason why hundreds of companies from coast to coast have been depending on Foremost-El Dorado shipments for over 65 years. We ship to your requirements — in drums, bags, and in tank cars. Also mixed compartment tank cars of acids and esters. Supplies near you to meet your deadline.

If you have any unusual requirements, let our representatives work with you. For the Foremost-El Dorado Agent in your area, write, wire or phone: Department CP-960

COCONUT FATTY ACIDS		COCONUT METHYL ESTERS	
Caprylic	*Palmitic*	*Caproate*	*Palmitate*
Capric	*Cocoleic*	*Caprylate*	*Oleate*
Lauric	*Eldhyco**	*Caprate*	*Eldo* 18*
Myristic	*Coconut*	*Laurate*	*Coconate*
		Myristate	

*T. M. Reg.

Foremost EL DORADO

FOREMOST FOOD AND CHEMICAL COMPANY

P. O. BOX 599 • OAKLAND 4, CALIF.

Check 4706 opposite last page.

Open-up, snap-close— Result: insulated pipe

Uses: Pipe-insulation applications.

Features: Insulation is constructed with longitudinal seams permitting it to spread open to receive pipe. Upon release, it snaps quickly into position.

Description: Urethane-film pipe insulation is designed to insulate in −300 to +275°F range. It is manufactured in many shapes and sizes to meet various requirements.



Urethane-foam pipe insulation is available in various shapes to meet differing needs

Foam system for insulation is supplied by Isocyanate Products, Inc. Basic urethane chemicals for system are furnished by Mobay Chemical Company.

(Thermal insulation is product of American Cellular Co., Inc., Box 49, New Castle, Del.)
Check 4707 opposite last page.

Disposable air filters have high efficiency, low pressure drop

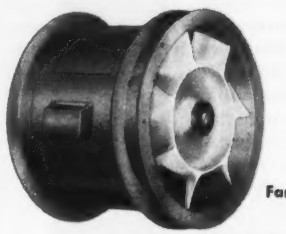
Pleated design assures peak dirt-holding capacity

Uses: Filtering air in industrial ventilating systems.

Features: Filters are designed for low pressure drop and high efficiency. Dirt-holding capacities range from 35 to 85%.

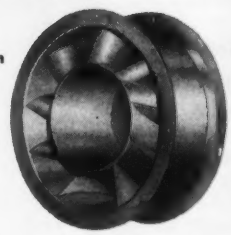
Description: Deep-pleated

another outstanding design development from *Aerovent*



Fan Housing

Vane Section



new
direct-connected
vaneaxial fans
with removable vane sections

Engineered for high-pressure, high-velocity air distribution systems, these units feature a unique removable vane section which simplifies installation and permits easy access for routine cleaning and maintenance.

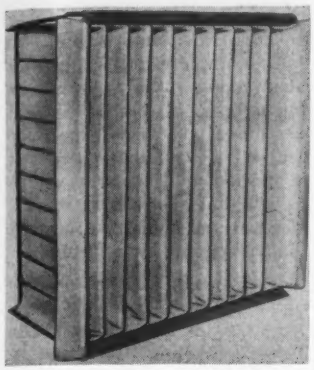
Available in 30 models in sizes 18" to 48" for capacities from 3230 to 67,300 cfm with special design features for all application requirements.

Write for Bulletin 475

Air deliveries of Aerovent equipment determined in accordance with established and accepted codes and guaranteed by manufacturer. CERTIFIED PERFORMANCE

Aerovent *Aerovent*
FAN COMPANY, INC.
Ash and Burr Streets Piqua, Ohio

Check 4708 opposite last page.



Pleated air filter cartridge provides large filter area in compact space

design gives maximum filter area in compact space. Folding, disposable and interchangeable cartridges are fireproof and easy to install.

Filters are available in three series: HP-2 (35% range), HP-100 (85%) and HP-200 (95%). Latter two consist of reinforced, fine glass fibers. The HP-2 filter is made of nonwoven cotton fabric.

(Disposable air filtered cartridges are product of Farr Company, P. O. Box 90187, Airport Station, Los Angeles 45, Calif.)

Check 4709 opposite last page.

Rubber O-ring is the key to temp compensation in vinyl-pipe joints

Special technique developed by Europeans

A method of joining vinyl pipe, in which conventional bell-and-spigot-type slip joints are coupled with Hycar-nitrile-rubber O-rings, is being widely used in Europe. Resulting joint can move sufficiently to take up any expansion and contraction caused by temperature changes.

With this technique, one end of each pipe length is heated and belled-out on mandrel so that inside diam exceeds outside diam of plain pipe end. O-ring is then slipped over plain pipe end. This is then pushed into bell end of next section of pipe. O-



INTERCHANGEABLE UNION ENDS FULL PORT OPENING BETTER BALL VALVE

Versatile Cooper Ball Valves throttle like globe valves; handle slurries like diaphragm valves; control flow with the positive on-off operation of gate valves. Full port openings — straight through flow pattern — no turbulence. Interchangeable union ends for maximum versatility in any of the wide variety of end connections available. Valves go "on stream" in minutes. No other ball valves give you these plus features which guarantee maintenance-free operation and *eliminate costly down time.* Write for Bulletin BVF.

COOPER CA ALLOY
Corporation • Hillside, New Jersey

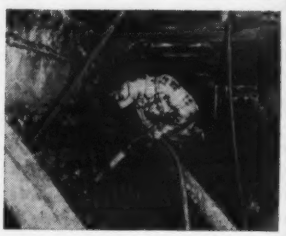
Check 4710 opposite last page.

ring rolls and places itself into position in middle of bell.

To complete joint, portable oven using infrared lamps or bottle gas is placed around bell. Bell is then heated for four to eight min. When heat is applied, bell tends to return to original shape and dimensions, thus squeezing around plain pipe end and O-ring.

(Hycar nitrile rubber is product of B. F. Goodrich Chemical Company, 3135 Euclid Ave., Cleveland 15, Ohio.)

Check 4712 opposite last page.



Cleaning preheater tube in cramped quarters

. . . is tough task made easier by this operator who uses air-driven motor and heavy duty carbide-tipped drill bit to do the job.

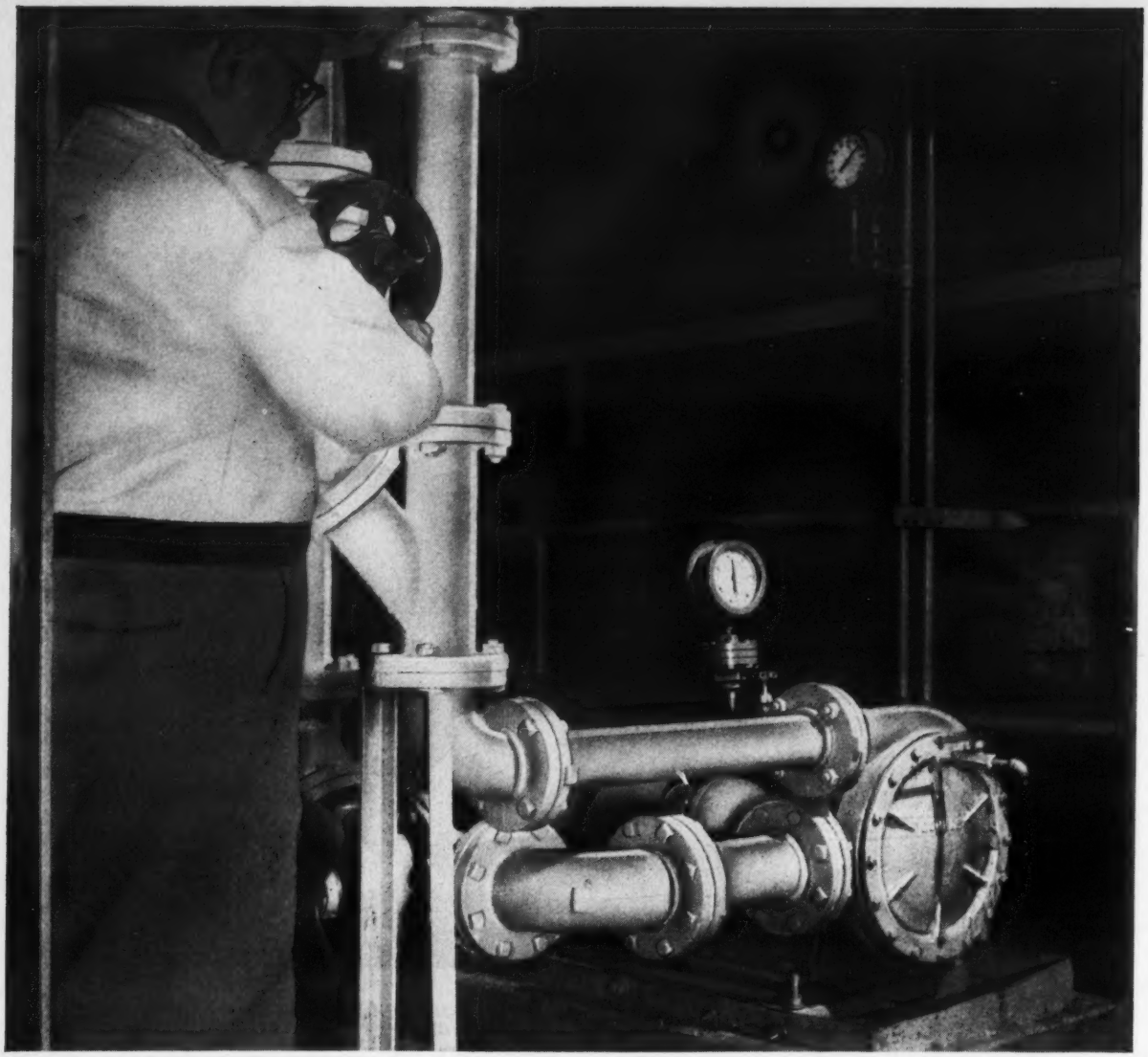
In cases like this where head room is limited, ordinary boiler tube cleaners are often recommended. Although less powerful than drill-type cleaners, they can be readily inserted into tube even where heater roof comes to within two ft of tube sheet.

When using this type of equipment, it is well to remember that accessories ordinarily utilized with mechanical boiler-tube cleaners are not always suitable for solid plugging frequently found in such tubes. Here carbide-tipped drill bits attached directly to motor rotor shaft by adaptor have been found effective.

In such cases motor diam should be ¼ to ½" less than inside diam of tube to be cleaned. This permits upward passage of chips being dislodged from heavily plugged tubes.

(Equipment shown in photograph is product of Thomas C. Wilson, Inc., Long Island City, N.Y.)

Check 4713 opposite last page.



Cast Nickel Stainless Steel helps pump high-purity synthetic rubber latex

Pump casings and impellers resist corrosive attack, are easy to keep clean

Synthetic rubber latex must be concentrated to a high per cent solids content for many commercial uses. And it must possess a certain amount of instability so that it can be easily coagulated or gelled for desired applications.

Moving the latex through a concentrating line demands a firm but gentle pumping action—often a tricky combination to achieve.

One leading producer of high-purity synthetic-rubber latex solved its problem with a series of Goulds Pumps that do the job on minimum power, with almost no downtime. In these pumps, impellers and casings are cast from CF-8M* stainless, containing approximately 19% Cr, 10% Ni, and 2½% Mo. Here are some direct benefits:

- Clean, semi-open impeller design, for fast movement of viscous matter with a minimum of friction, shock and clogging.
- Easy routine cleaning, since the parts are conveniently removable.
- Protection of purity, thanks to the outstanding corrosion resistance of Nickel-containing stainless steel castings.

If you're looking for similar advantages, perhaps suitable Nickel-containing castings can provide them. Want more information? Write for the useful booklet, "Heat Resistant Castings, Corrosion Resistant Castings . . . Their Engineering Properties and Applications."

*Alloy Casting Institute designation

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street New York 5, N.Y.

INCO NICKEL

NICKEL MAKES CASTINGS PERFORM BETTER LONGER

Check 4711 opposite last page.

THAT'S INTERESTING

Building on research

For every dollar spent on research, three dollars is spent eventually on building, a study of the pattern for the past 25 years indicates, according to Du Pont. Using 1959 as a yardstick, the $90 million spent on research will eventually require construction costing $270 million.

Adios to alopecia

Alopecic individuals will be pleased to learn that this affliction (baldness) can apparently be cured by local steroid injections, Dr. Norman Orentreich recently told the Society of Cosmetic Chemists.

Hydrocortisone acetate was most effective steroid of those tried.

For more information on product at right, specify 4714 see information request blank opposite last page.

This pump can give you a price advantage!

The Goulds-Pfaudler glassed pump cuts pump replacement and maintenance costs for many companies making cosmetics, drugs, plastics, paints and other products requiring abrasive or corrosive pumpage. In these industries, where pump life is normally measured in months—or weeks—the Goulds-Pfaudler pump lives on and on.

Why? Because it resists corrosion by all acids, except HF, up to 350°F and alkalis at moderate temperatures. Because only severe mechanical impact can damage its glassed surface, and then only locally since the surface will not crack or shatter. Because it withstands quick changes in temperature—up to a 100°F differential under ordinary operating conditions.

The Goulds-Pfaudler glassed pump also cuts production costs in other ways. It won't, for example, contaminate your product. It exerts no catalytic effect. Products won't stick to it, causing shutdowns for cleaning.

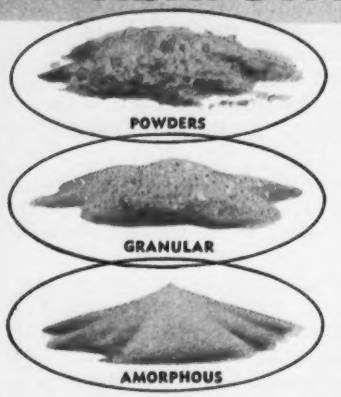
Yes, this pump could be giving your competitors a cost advantage. *But only if it's pumping their slurries and corrosives and not your own.*

For further details, write for Bulletin 725.2. Goulds Pumps, Inc., Dept. C-4, Seneca Falls, N. Y.

GOULDS PUMPS



UNMATCHED ACCURACY... with Vibra-Screw BULK FEEDERS



Minute by minute . . . hour by hour . . . VIBRA-SCREW Feeders precisely feed dry materials with unerring accuracy.

VIBRA-SCREW Bulk Feeders combine a vibrating screw rotation with a vibrating hopper, trough and tube. This exclusive new feature, offered in three styles, standard volumetric, feeder conveyor volumetric or gravimetric, now permits the positive handling of a wide range of different and difficult substances. Each VIBRA-SCREW unit is especially designed to meet specific feeding requirements.

Consider These Facts...

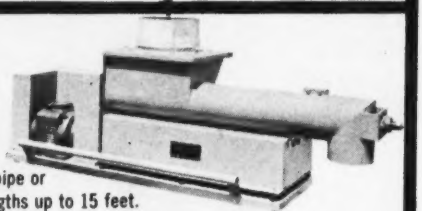
Standard Volumetric:

handles all materials, free flowing or sticky with complete accuracy. Capacity ranges from ounces to tons per hour.



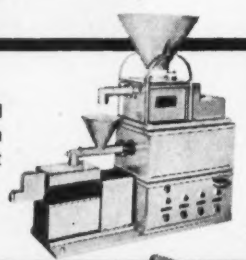
Feeder Conveyor Volumetric:

for heavy duty service. Feeds and conveys horizontally from supply pipe or hopper. Tonnage rates with screw lengths up to 15 feet.



Gravimetric:

delivers weighed batches directly into process timed intervals. Handles quantities down to one ounce with variable frequencies up to 4 per minute. Intermittent charges are easily converted into self-adjusting, continuous weight-controlled stream by using a continuously rotating and vibrating third screw.



Write Today **for more information and interesting literature including valuable engineering data. We invite your inquiries . . . just send us the details of your dry materials handling problem.**



Vibra-screw FEEDERS, INC.

156 Huron Avenue / Clifton, New Jersey

Check 4715 opposite last page.

NEW LITERATURE
Plant Engineering Maintenance & Safety

Rotary positive-air-pressure and high-vacuum pumps, gas boosters and air motors are inventoried in 32-page catalog giving details of construction, dimensions, capacities, performance curves on all pumps, and comprehensive engineering and application data. Cat 460—Leiman Bros., Inc.

Check 4716 opposite last page.

Liquid-relief and special-service safety-relief valves are reviewed in 28-page catalog, incorporating sizing information, capacity tables, weights and dimensions, and application data to aid in valve selection. Cat FE-138—Farris Engineering Corporation.

Check 4717 opposite last page.

Pressure regulators of sliding-gate type are detailed in eight-page catalog. Self-operated, pilot-operated, solenoid-operated and back-pressure models are featured in Cat J160-1—OPW-Jordan.

Check 4718 opposite last page.

Machining of Teflon is topic of discussion in 12-page booklet which includes suggestions for stress-relieving; tools and coolants; speeds and rates of feed; rakes, angles and clearances; burrs and chips; turning, boring, drilling, tapping, reaming, counterboring, grinding; fly-cutting; surface finishes; and tolerances. Form 0701—Plastic Products Division, Raybestos-Manhattan Inc.

Check 4719 opposite last page.

Multi-shielded motors are presented in 56-page catalog incorporating pricing and dimensional data on motors of ¼ to 200 hp. Information is included for various modifications, such as specialized mountings and enclosures. Cat 200—Sterling Electric Motors.

Check 4720 opposite last page.

Centrifugal fans with flat, backwardly inclined blading are specified in 76-page catalog. Booklet consists mainly of tabular performance data and dimensions for AMCA Classes 1, 2, and 3 fans. Cat 1120-1—Westinghouse Sturtevant Division, Westinghouse Electric Corporation.

Check 4721 opposite last page.

Industrial air conditioning is discussed in 12-page booklet which presents four key check figures, with which plant executives can qualify their operation. Industrial Air Conditioning Bul—Carrier Corporation.

Check 4722 opposite last page.



FIGHT FOAM FAST! with SAG SILICONE ANTIFOAM

CHEMICAL processors who use SAG Silicone Antifoam have made tremendous strides in fighting or controlling foam in many applications.

After a recent trial of SAG 47 Antifoam in a chemical plant, one customer reported: "This proves to be an excellent product for us. It requires smaller concentrations than previously used competitive products because of its lower viscosity and excellent dispersibility."

Years of research went into development of SAG Antifoams to make them *fight foam fast.* There are two types: SAG 470 Emulsion for aqueous systems; SAG 47 Fluid for non-aqueous systems. Just a few cents worth can eliminate thousands of cubic feet of costly, space-eating foam. Both products are shipped ready to use. And they're stable in storage. Mail the coupon today for samples and technical assistance.

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Dept. IC-4001

Silicones Division, Union Carbide Corporation
270 Park Avenue, New York 17, N. Y.
(In Canada: Union Carbide Canada Limited, Bakelite Division, Toronto 12.)

Send sample of ☐ SAG 470; ☐ SAG 47 fluid; and data on SAG Silicone Antifoams.

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COMPANY _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

"Union Carbide" and "SAG" are trade marks of UCC.

Check 4723 opposite last page.

Thermal insulating materials are reviewed in 18-page booklet which emphasizes economic-thickness approach to specification. Dollar savings, through reduction of heat loss, process control, condensation prevention, and protection of personnel and equipment, are given as four main functions of insulation. Detailed descriptions and characteristics of types of insulation are also included. Booklet contains index to ASTM and Government specifications. "Re-thinking Thermal Insulation"—National Insulation Manufacturers Assn.

Check 4724 opposite last page.

Speed reducers of worm-gear fan-cooled type are available in 25 styles in over 135 different sizes pressure ranges from 5:1 to 3600:1 with torque ratings to 135,000 lb-in and ratings to 150 hp. They are all expanded upon in 66-page Book 2824—Link-Belt Company.

Check 4725 opposite last page.

Electric motors, in 1/20- to 400-hp range of polyphase, single-phase and DC types, are inventoried in 16-page Form 270 B—Century Electric Company.

Check 4726 opposite last page.

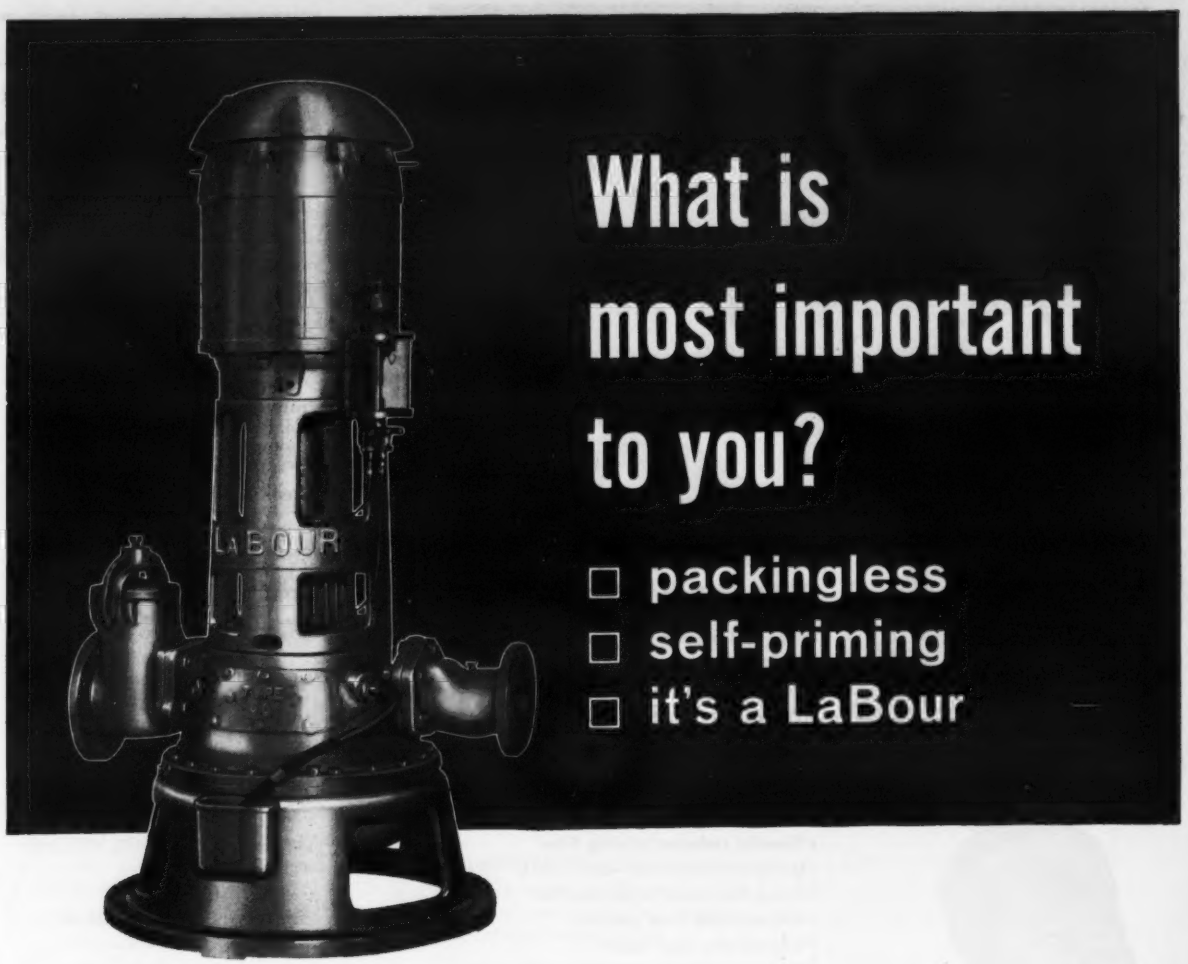
Rotary-pump technical data is presented in 18-page manual which has condensed data on liquids in eight classifications according to viscosity. Each classification has its own selection table. Table with typical liquids of given viscosity are listed on left-hand pages. On facing pages, many others of same viscosity are tabulated. Rotary-pump Selection Manual—The Deming Company.

Check 4727 opposite last page.

Sizing water-hammer arrestors in multiple branches is purpose of new scientific method which considers all factors and right size and number of shock-absorbing units required to protect multiple-fixture branch installations. Pad containing 25 sheets, each with nomograph developed for this method, is contained in Form 37-ADV—Plumbing Products Division, Zurn Industries, Inc.

Check 4728 opposite last page.

Welding handbook (Third Section of Fourth Edition) is cloth-bound, 512-page volume containing 335 illustrations, 78 tables and comprehensive index. Special welding and metal-joining processes are covered, as well as arc-cutting processes. Ultrasonic welding is also discussed, in addition to adhesive bonding and plastics welding. Copies of Welding Handbook, Section III may be obtained at $9.00 per volume from the American Welding Society, 33 W. 39th St., New York 18, N.Y.



PACKINGLESS: No stuffing box troubles because there's no stuffing box—no leaks, no wear, no repacking. Saves time and money.

SELF-PRIMING: Avoids bottom outlets in tanks, permits great flexibility of piping lay-out, keeps dangerous liquids under less than atmospheric pressure during transfer to pump—features worth a great deal to you.

IT'S A LaBOUR: Corrosion-resistant characteristics are assured because LaBour operates its own foundries, holding extremely close metallurgical tolerances. Efficiency and dependability are proved by LaBour's nearly 40 years of service to the chemical industry, dating back to the first self-priming centrifugal pump ever put on the market.

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LABOUR

THE LaBOUR COMPANY, INC. • ELKHART, INDIANA
WHITE PIGEON, MICH. • LONDON, ENGLAND

Check 4729 opposite last page.

SHEAR-FLOW



Shear-Flow's high shear action produces finer, faster blending, dispersing and homogenizing. The new Model RL Shear-Flow portable mixer represents a major advance in mixer design. The new Hi-Shear Head consists of two rotating impellers and two stationary stators enclosed in a cylindrical housing. The fine clearance between impellers and stators results in rapid shearing action and a high degree of turbulence, resulting in a more complete reduction of agglomerates within the mixture.

- Greatly reduces mixing time
- Uniform circulation—no vortex
- Emulsifies immiscible liquids
- Controllable flow pattern
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- Handles viscous materials with ease
- No operating torque

HAS A GOOD HEAD FOR BUSINESS



Close tolerances between impellers and stators promotes high shear for reduction and dispersion of material.

Adjustable deflector plate controls flow pattern for desired mixing action and air entrainment.

Three basic portable models for processing 1 to 250 gals. plus continuous mix units for high volume processing.

Write today for complete information on the Shear-Flow line of mixers.

SHEAR-FLOW
GABB SPECIAL PRODUCTS INC.

GABB SPECIAL PRODUCTS INC.
Windsor Locks, Conn.

Check 4730 opposite last page.

manufacturers' current literature

This section features a variety of literature currently available from manufacturers. See also the other sections in this issue for new literature pertaining to those particular sections

Safety

Protective breathing equipment is explained in Protective Breathing Equipment Bul—Scott Aviation Corporation.

Check 4731 opposite last page.

Hycar protective gloves are specified in Sureseal Glove Bul—The Surety Rubber Co.

Check 4732 opposite last page.

Safety-relief valves' sealing bellows protect against damage from contaminants, corrosion or viscous fluids. Available in both balanced-bellows and standard designs, valves are topic of Cat 1900 and Bul 1940—Valve Division, Manning, Maxwell & Moore, Inc.

Check 4733 opposite last page.

Corrosion Control

Dry bearing material is available in all basic forms—such as sheet, rod or tube, or in parts molded or machined to specifications. It is expanded upon in Bul T-120—Crane Packing Company.

Check 4734 opposite last page.

Corrosion resistance is offered by hard-rubber casing and impeller and Hastelloy-C shaft of pump. The 80-gpm model is specified in Bul CE-55—American Hard Rubber Company, Division of Amerace Corporation.

Check 4735 opposite last page.

Valves of porcelain with Teflon packing are designed for corrosion-resistance to all acids of all concentrations (except hydrofluoric). Details on these valves are recorded in Cat 567—Process Equipment Division, Lapp Insulator Co. Inc.

Check 4736 opposite last page.

TFE Teflon packing sets for valves, heat exchangers, and other static and semi-static applications are detailed in Bul CP-552—Chemical & Power Products, Inc.

Check 4737 opposite last page.

Pressure-sensitive tape, for corrosion-resistance applications at temperatures to 400°F, is available from stock in ¼ to 2″ widths in 36-yd rolls. Tape is reviewed in Temp-R-Tape® FR Bul—Connecticut Hard Rubber Co.

Check 4738 opposite last page.

Rigid PVC Schedules 40, 80 and 120, ½ to 4″ pipe, threaded or socket-weld fittings, and ½ to 2″ valves are detailed in Bul CE-56—American Hard Rubber Co., Division of Amerace Corporation.

Check 4739 opposite last page.

Rubber-components application to intricate surfaces including centrifugal-pump line, is discussed in Rubber Division Bul—Rubber Division, Industrial Filter & Pump Mfg. Co.

Check 4740 opposite last page.

Diaphragm valves are rubber- or plastic-lined in cast-iron or solid-plastic bodies. They are available in sizes of ½ to 6″ and detailed in Diaphragm Valves Bul—American Hard Rubber Company, Division of Amerace Corporation.

Check 4741 opposite last page.

Polymer linings for wood tanks permit retention of practically any chemical solution—from 0 to 14 pH. Combination of wood membrane and variety of polymer films is treated in NWTI Buls 1-5—Wendnagel & Co., Inc.

Check 4742 opposite last page.

Centrifugal pumps of PVC and polypropylene construction (for wetted parts) are available in capacities of 10 to 180 gpm, discharge heads to 160′. Pump line is reviewed in Plastic Centrifugal Pumps Cat—Vanton Pump & Equipment Corp., Division of Cooper Alloy Corp.

Check 4743 opposite last page.

Acid-proof cement provides resistance to all corrosive acids (except hydrofluoric) at temperatures to 2000°F. It can be gunited, poured, cast in forms or applied as topping over concrete, brick or tile. Cement is detailed in Pour-Lay Cement 54 Data Sheet—Sauereisen Cements Co.

Check 4744 opposite last page.

Fibercast tube and pipe has sufficient strength for installation on span racks with spacing normally used for metal pipe. They are specified in Tube and Pipe Bul—Fibercast Company, Division of Youngstown Sheet and Tube Co.

Check 4745 opposite last page.

Vaccum pans, in capacities of 10 to 500 gal, and quick-cooling pans, with capacities of 50 to 200 gal, are subjects of Vacuum and Quick-cooling Pans Buls—Lee Metal Products Company, Inc.

Check 4746 opposite last page.

Corrosion-resistant long-tangent fittings of all types, including eccentric reducers, reducing tees and crosses, are specified in Fittings Cat—Horace T. Potts Company.

Check 4747 opposite last page.

High-impact rubber-plastic pipe, screw or solvent-welded fittings, and valves are reviewed in Bul 80A—American Hard Rubber Co., Div. of Amerace Corp.

Check 4748 opposite last page.

Protective coatings based on chlorinated natural rubber are treated in Parlon® Protective Coatings Bul—Hercules Powder Co., Inc.

Check 4749 opposite last page.

Valves for corrosive applications are reviewed in two bulletins. One utilizes Penton-coated body and rubber diaphragm, is available in ½ to 6″ sizes; second has body available in various plastics, uses soft-rubber or elastomer plunger to seal-off fluid flow, and is made in sizes of one to two inches. Valves are further specified in Buls 800C and 802D respectively —W. S. Rockwell Co.

Check 4750 opposite last page.

Kettle line includes 2/3-jacketed, 80- to 300-gal (CW); 2/3-jacketed, 5- to 500-gal (A); 2/3-jacketed, 5- to 100-gal (C); center-line scraper-agitator, 80- to 300-gal (CW3T); full-jacketed, 10- to 300-gal (B); and 2/3-jacketed 40- to 200-gal (Pressure) models. These are pictured in A, B, C, CW, CW3T and Pressure Kettle Buls—Lee Metal Products Company, Inc.

Check 4751 opposite last page.

Plastic's applications in corrosion resistance, as coating, tube, lining and gasketing, are reviewed in Tygon® Bul—Plastics and Synthetics Division, U.S. Stoneware.

Check 4752 opposite last page.

Material Handling

Tractor shovels feature six-ft turning radii, 2500-lb operating capacities, power-shift transmissions and torque-converter drives. They are depicted in H-25 Payloader Data—The Frank G. Hough Co., Subsidiary of International Harvester Company.

Check 4753 opposite last page.

Logistics of managing materials, including piggyback, containerization, protective-shipping and terminal-storage techniques, are considered in Logistics Bul—North American Car Corporation.

Check 4754 opposite last page.

Invertable bins can be tumbled, aerated and vibrated. Available in steel and aluminum, bins are depicted in Invert-A-Bin Bul—The Powell Pressed Steel Company.

Check 4755 opposite last page.

Vibrator line is incorporated in Vibration Inducers Cat—Martin Engineering Company.

Check 4756 opposite last page.

Bin vibrators of permanent-magnetic type have completely enclosed housings. Line is considered in Bin Vibrators Cat—Eriez Mfg. Co.

Check 4757 opposite last page.

Vibration's role in conveying and processing is discussed in Low-Veyor Selection Guide—Ajax Flexible Coupling Co. Inc.

Check 4758 opposite last page.

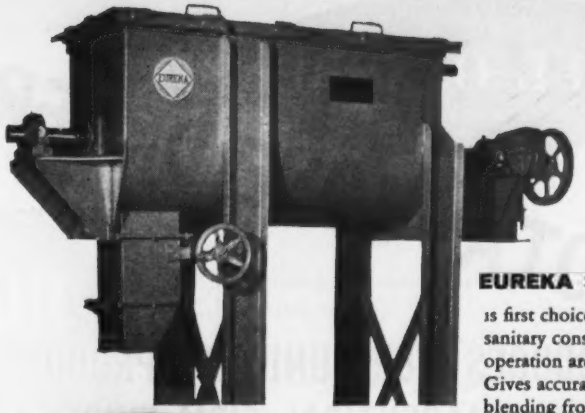
Separation and Size Reduction

Air separators can increase 40- to 400-mesh output as much as 300%. They are specified in Bul 087—Sturtevant Mill Company.

Check 4759 opposite last page.

Crushers and feeder-crushers can be used independently, or with attrition mills, hammer mills, breakers, granulators or fiberizers, to speed processing of many types of material. Two models are reviewed in Crusher 249-C and Feeder-crusher 249-B Buls—The Bauer Bros. Co.

Check 4760 opposite last page.



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is first choice where sanitary construction and operation are essential. Gives accurate, uniform blending from light-dry to heavy-dense materials. Wide choice of models and capacities.

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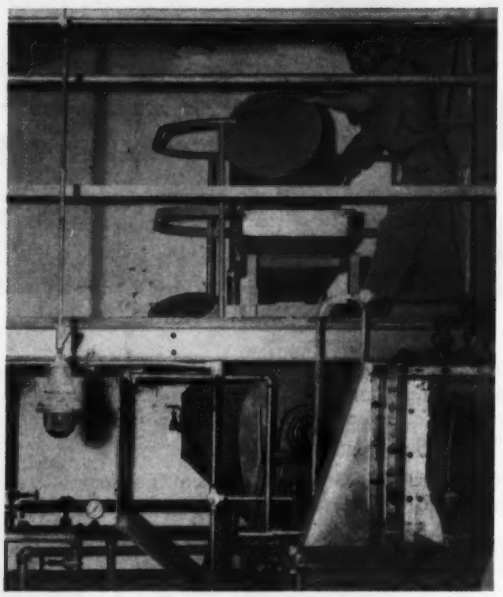
Since 1856 making good equipment ***better!***

Check 4761 opposite last page

PAUL O. ABBÉ

ROTA-CONE DRYER

"PRODUCES MORE UNIFORM PRODUCT" PHARMACEUTICAL FIRM FINDS



"We find that the tumbling action employed in your 'Rota-Cone' dryer produces a more uniform product than our old tray-drying method, by providing a mixing action as it dries," an important pharmaceutical firm tells us.

"The tumbling action provides contact of the material with the heated surface, so it assures more even drying. A vacuum also removes the moisture-laden air and so makes it possible to dry not only more evenly, but at lower temperatures."

The manufacturer also reports no decomposition of the material—which occurred when tray-drying was employed. They add: "Your 'Rota-Cone' has many advantages in comparison with tray-drying. Our material gets less exposure to dirt, the machine is more economical of space, and 1/3 less labor is required. Temperatures too, are automatically controlled at 30°C. to 90°C."

Paul O. Abbe "Rota-Cone" Dryers are used today for metal powders, chemicals in powdered, flaked, and granular form, textiles, pharmaceutical powders, plastic resins, and other products.

For full details of these machines, write today for our 12-page brochure "C". No obligation.

PAUL O. ABBE

402 CENTER AVE. LITTLE FALLS, NEW JERSEY

BALL & PEBBLE MILLS
DRY & PASTE MIXERS
DRYERS & BLENDERS

Check 4762 opposite last page.

CURRENT LITERATURE

Fluid-energy mills can, simultaneously with grinding, dehydrate, coat particles, blend and achieve chemical changes. They are analyzed in Jet-O-Mizer Bul—Fluid Energy Processing & Equipment Company.

Check 4763 opposite last page.

Continuous mulling is possible with recently developed units in pan-retention capacities of 6 to 120 cu ft. They are delineated in Multi-Mull Bul—Simpson Mix-Muller Division, National Engineering Company.

Check 4764 opposite last page.

Information on grinding has been incorporated in Ball Mill Bul—Traylor Engineering & Manufacturing, Division of Fuller Company, Subsidiary of General American Transportation Corporation.

Check 4765 opposite last page.

Crushers for primary, secondary or fine reductions are presented in Bul 1126—Traylor Engineering & Manufacturing, Division of Fuller Company, Subsidiary of General American Transportation Corporation.

Check 4766 opposite last page.

Centrifuges incorporate combination of separating action of centrifugal force, filtering action of screens and solids-metering action of screw conveyors—applied simultaneously to slurry. Line is presented in Super Conejector Bul—The Sharples Corporation.

Check 4767 opposite last page.

Pelletizers are available in variety of models to suit requirements such as size of cube, capacity, feeding-in speed, etc. Machines come in range of 6 to 42″ throat width. These and other data are expanded upon in Pelletizers Bul—Taylor, Stiles & Company.

Check 4768 opposite last page.

Chemical Materials

Activated carbon's role in purification, recovery and catalysis is analyzed in Literature Group J-46—Barnebey-Cheney.

Check 4769 opposite last page.

Hydrogen-peroxide properties and reactions for various degrees of solution and purity are presented in Tech Buls 2, 41, 42, 46 and 70—Beeco Chemical Division, Food Machinery & Chemical Corporation.

Check 4770 opposite last page.

Silicone defoamers for various applications are reviewed in Silicone Defoamers Bul—Dow Corning Corporation.

Check 4771 opposite last page.

Alkylphenols, including octylphenol, nonylphenol and dodecylphenol, are covered in 16-page booklet which includes reactions, uses, physical properties, storage and handling. Alkylphenols Booklet—Rohm & Haas Company.

Check 4772 opposite last page.

t-Alkyl amines are available in commercial quantities and wide range of molecular weights. Reaction information on these is presented in 44-page t-Alkyl Amines Bul—Rohm & Haas Company.

Check 4773 opposite last page.

Epoxidation and hydroxylation with hydrogen peroxide and peracetic acid is subject of discussion of Bul 69—Becco Chemical Division, Food Machinery & Chemical Corporation.

Check 4774 opposite last page.

Hexachlorophene is imparting bacteriostatic and deodorant properties to more than 2000 products. Material is subject of G-11 Hexachlorophene Bul—Sindar Corporation.

Check 4775 opposite last page.

Organic chemicals' condensed specifications, basis of sale, packaging and handling data, and glossary of synonymous ("Chemical Abstracts" and commercial) names are incorporated in Organic Chemicals Cat and Price List—National Aniline Division, Allied Chemical Corporation.

Check 4776 opposite last page.



"Another joint chemists-engineers meeting."

T. F. Sinclair, Linde Co.

CURRENT LITERATURE

Peroxides, some of which are specially fitted to high-temperature oxidation reactions, are reviewed in six bulletins. Calcium Peroxide, Magnesium Peroxide, Sodium Carbonate Peroxide, Sodium Perborate, Urea Peroxide and Zinc Peroxide Buls—Becco Chemical Division, Food Machinery & Chemical Corporation.

Check 4777 opposite last page.

Trimethylolpropane is available in any quantity and is shipped in protective multi-wall polyethylene-coated aluminum-foil-lined heat-sealed bags. Product is specified in Trimethylolpropane Bul—Celanese Chemical Company, Division of Celanese Corporation of America.

Check 4778 opposite last page.

Fluids Handling

Impulse steam trap is designed for applications on large autoclaves, cooking kettles, heat exchangers, heating coils and other heavy load applications. Trap is delineated in Steam Trap 40 Bul—Yarnall-Waring Company.

Check 4779 opposite last page.

Stainless-steel fittings for Schedules 5 and 10 pipe are tabulated in Stainless-steel Fittings Cat—Victaulic Company of America.

Check 4780 opposite last page.

Pump cups can be obtained in various types, including conventional and 45°-bevel types. They are analyzed in Bul 5903—Darling Valve & Manufacturing Co.

Check 4781 opposite last page.

Spray nozzles, for washing, cooling, processing, humidifying, dehydrating and other applications, are inventoried in Spray Nozzles Cat—Binks Manufacturing Company.

Check 4782 opposite last page.

Steam traps of five types—thermodynamic, balanced-pressure-thermostatic, float-thermostatic, liquid-expansion and bucket—are delineated in Steam Traps Bul—Sarco Company, Inc.

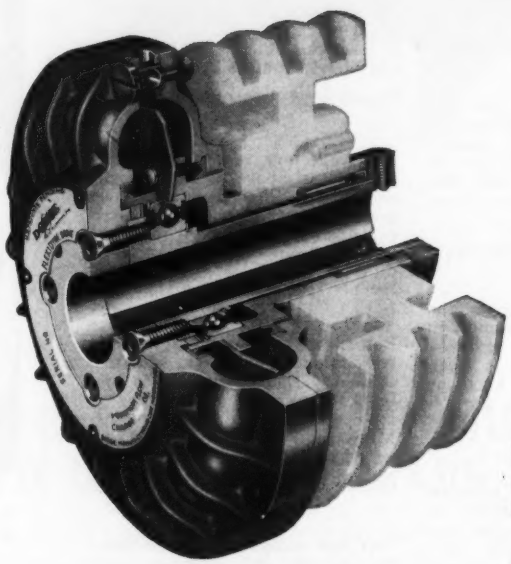
Check 4783 opposite last page.

Vertical end-suction pumps, with capacities to 1800 gpm and heads to 320', are delineated in Vertical End-suction Pumps Bul—Aurora Pump Division, The New York Air Brake Company.

Check 4784 opposite last page.

WHAT'S YOUR PROBLEM?...

- ☑ Overheated motors?
- ☑ Excessive belt maintenance?
- ☑ Breakage of materials being processed —like thread, wire, paper?
- ☑ Expense of oversize or high torque motors?
- ☑ High demand rate?
- ☑ Expense of reduced voltage starters?
- ☑ Clutch trouble?
- ☑ Breakage of transmission parts due to instantaneous shock loads?
- ☑ Damage and recurring down-time from overloads?



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It is no longer necessary to accept the destructiveness—the costliness—of conventional starting in the mechanical transmission of power. Flexidyne changes that!

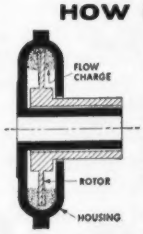
Flexidyne is the new way to start loads *smoothly*—to protect against shock and overload—to save power—all *without any sacrifice of efficiency at full load!*

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Check 4785 opposite last page.

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ERIEZ

Check 4786 opposite last page.

Drying and Heating

Ovens and dryers, in batch and conveyor models to 1000°F, are available in gas, electric, steam, oil and radio-frequency types. They are depicted in Bul 157—Young Brothers Co.

Check 4787 opposite last page.

Drying equipment of stainless steel for corrosion and contamination protection, is inventoried in Drying Equipment Bul—Davenport Machine and Foundry Company.

Check 4788 opposite last page.

Control of air moisture is subject of discussion in Dryers Bul—Pittsburgh Lectrodryer Division, McGraw-Edison Company.

Check 4789 opposite last page.

Dryers are constructed in prefabricated structure with trussed-and-tensioned insulated panels. Facts on these models are incorporated in Drying Bul—The National Drying Machinery Company.

Check 4790 opposite last page.

Heat-transfer tube of copper and copper alloys becomes stronger at —300°F than at room temperature. Tube is considered in Heat-transfer Tube Bul—The American Brass Co.

Check 4791 opposite last page.

Silicon-carbide heating elements for temperatures to 2800°F are expanded upon in Tech Bul H—Globar Plant, Refractories Division, The Carborundum Company.

Check 4792 opposite last page.

Drum heater is designed for lifting or lowering by pulleys and counter-balancing weights. Unit weighs 95 lb and is pictured in Drum Heaters Bul—Glas-Col Apparatus Company.

Check 4793 opposite last page.

Multi-stream steam generator incorporates number of separate independent circuits enclosed in single shell. Specifications of this unit are tabulated in Bul HE-8—Henry Vogt Machine Co.

Check 4794 opposite last page.

Electric heating of steam and air and other gases is discussed in Cat 60—Edwin L. Wiegand Company.

Check 4795 opposite last page.

Electric, liquid heat-transfer systems have all components (pumps, by-pass relief valves, strainers, expansion tanks, temperature controls, contactors and disconnect switches) in one cabinet. Systems are dealt with in Heat-transfer Systems Bul—Radcor, Inc., Subsidiary of Edwin L. Wiegand Company.

Check 4796 opposite last page.

Processing Equipment

Vapor condensers, which mount directly on steel structure of evaporator or distillation column are subject of Bul 129—Niagara Blower Company.

Check 4797 opposite last page.

Pulp and storage tanks, in 500- to 2000-gal and 100- to 5000-gal capacities, respectively, are tabulated in Pulp and Storage Tanks Buls—Lee Metal Products Company, Inc.

Check 4798 opposite last page.

Dust collectors, with collection efficiencies of above 99% by weight and 95% by discoloration test, use synthetic filter fabrics. They are explained in "Dusttube Collectors" —Wheelabrator Corp.

Check 4799 opposite last page.

Portable mixers, each consist of two rotating impellers and two stationary stators enclosed in cylindrical housing. Further details on these are explained in Shear-Flow Mixers Bul—Gabb Special Products Inc.

Check 4800 opposite last page.

Wet dust collectors are self-cleaning and fire- and explosion-proof. Complete story on these washers is incorporated in Bul W-7456—The Ducon Company Inc.

Check 4801 opposite last page.

Processing equipment of various types, including sizes, scales, classifiers, screens, conveyors and blenders, are indexed in Process Equipment Cat—S. Howes Co., Inc.

Check 4802 opposite last page.

Filters can be custom designed to meet specific needs. Example: System for refinery incorporating self-contained variable-speed drive, modern lighting and sight glasses, and two- and three-inch Foamglas insulation for low-temperature operation. Such filters are reviewed in Filters Bul—Goslin-Birmingham Manufacturing Co., Inc.

Check 4803 opposite last page.

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BINS



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ERIEZ

Check 4804 opposite last page.

CURRENT LITERATURE

Custom-engineered evaporators are subject of Evaporators Bul—Thermovac Inc., Subsidiary of Rheem Manufacturing Co.

Check 4805 opposite last page.

Filteraid is available in six grades for variety of applications. It is delineated in Nerofil Bul—Nero Products Dept., Great Lakes Carbon Corp.

Check 4806 opposite last page.

Valves

Steel valves, of globe, angle, lift, check and other designs, are tabulated in Steel Valves Bul—Valve Division, Manning, Maxwell & Moore, Inc.

Check 4807 opposite last page.

Valve line features variety of types including gate, globe, angle, check and Y models in wide selection of pure metals and alloys. These are specified in Valves Bul—The Wm. Powell Company.

Check 4808 opposite last page.

Butterfly valves of manual or automatic types are available in sizes to 144". They are tabulated in Butterfly Valves Bul—W. S. Rockwell Company.

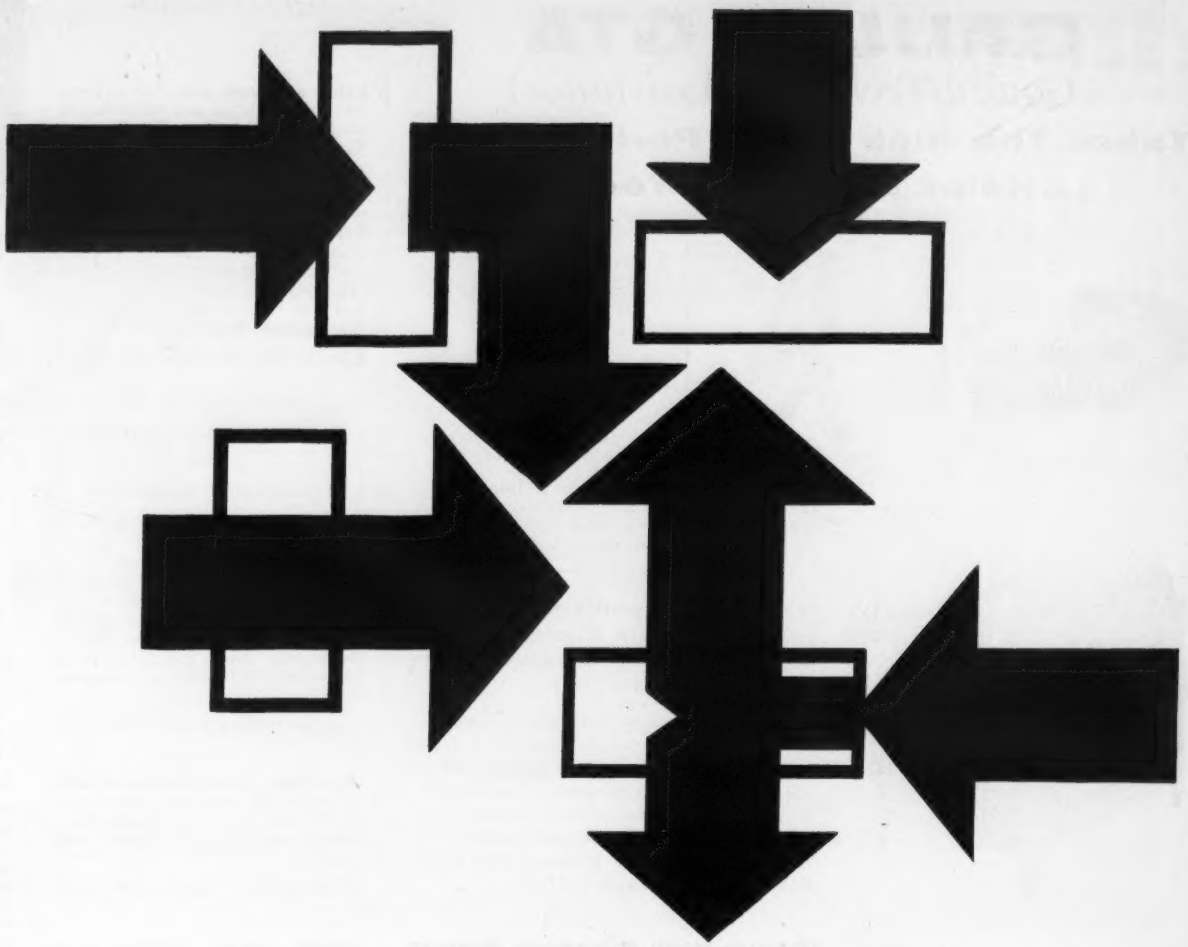
Check 4809 opposite last page.

Forged-steel gate valves are available for service to 600 psi at 900°F, 800 psi at 850°F and 2000 psi WOG. In sizes of ¼ to 2", valves are pictured in Forged-steel Gate Valves Bul—Industrial Products Group, Crane Company.

Check 4810 opposite last page.

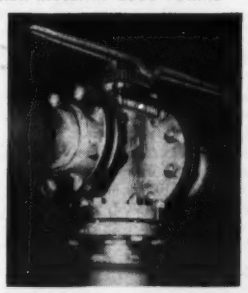


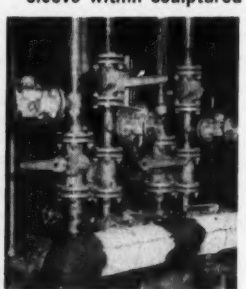
"5000 bbl/hr . . . 0.982 density! You mean you can tell all that just from the vibrations!"



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If you need bubble-tight closure in ON-OFF service... plus absence of product contamination, corrosion resistance and ease of operation too... you should know about Continental's Tufline* plug valves. ■ For instance, Air Reduction installed 1065 Tufline valves in its new polyvinyl alcohol plant at Calvert City for main, vent, drain and block service. Materials being handled range from highly viscous batch-still bottoms to hard-to-hold volatile stream components. ■ Tufline's special design accommodates changes in temperature and pressure while still maintaining sealing without leakage. Absence of any lubricant avoids stream contamination... low friction Teflon sleeve permits quick and easy operation. Valve seats remain unexposed in both the open and closed positions, for long trouble-free service. ■ The same basic construction (pre-stressed Teflon sleeve within sculptured inner body bore) is available in many models to suit your specific needs. Sizes from ¼" to 8"... up to 5-way operation... wrench, gear, chain or actuator operated... broad choice of metals... for temperatures from —150°F to +400°F and pressures from high vacuum to 615 psi (depending on temperature). For complete information, ask for bulletin SC-60. Teflon is a registered trademark of E. I. Dupont de Nemours & Co., Inc. *T.M. Reg.





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Check 4811 opposite last page.

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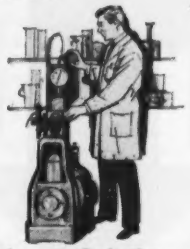
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GTA Bulletins

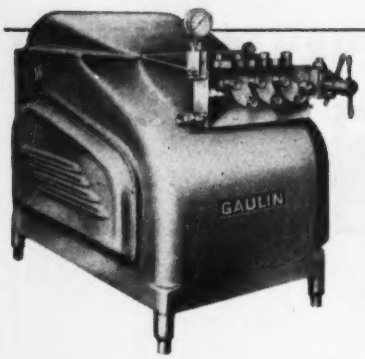


Technical Assistance



Laboratory Evaluation

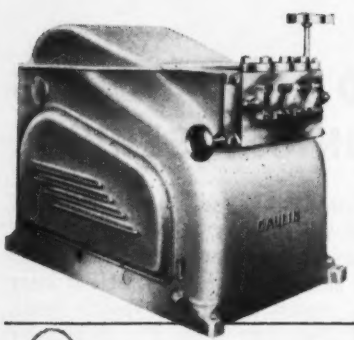
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and SUB-MICRON DISPERSERS reduce ingredients to finer, more uniform particle size.

Gaulin Homogenizers and Sub-Micron Dispersers disperse, emulsify and blend products reducing them to their ultimate particle size. They improve product uniformity, stop separation, assure more stable emulsions, accent taste, stop color separation. Ask for Bulletins — Homogenizers H-55; Sub-Micron Dispersers SMD-55.



Gaulin High Pressure Pumps

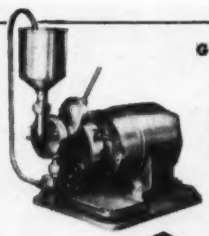
handle all types of liquids and densities of fluids . . . deliver measured flow in metering applications.

These rugged, heavy-duty pumps are built to minimize operating, inspection and maintenance costs. Capacities to 7500 GPH . . . pressures to 12,000 PSI. Well area can be gasketed to provide maximum safety in handling hazardous materials. Write for Bulletin P-55.



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55 Garden Street, Everett 49, Mass.

Check 4812 opposite last page.

CURRENT LITERATURE

Globe and angle valves of screwed and flanged types are tabulated in four-page Bul L-475—The Bastian-Blessing Company.

Check 4813 opposite last page.

Fixed-bearing ball valves are stocked with flanged or screwed ends and full or reduced ports in standard sizes of ⅛ to 10". Valve line is tabulated in Flo•Ball Valves Bul—Hydromatics, Inc.

Check 4814 opposite last page.

Process Instrumentation and Laboratory Apparatus

Stainless-steel Bourdon-tube pressure controls have operating ranges of 30" vacuum to 75 psig, 10 to 100 psig, 30 to 400 psig, 75 to 800 psig and 100 to 1000 psig. They are tabulated in Bul 019—The Mercoid Corporation.

Check 4815 opposite last page.

Electronic process instrumentation is topic of discussion considered in Process Instrumentation Bul—Swartwout Division, Crane Company.

Check 4816 opposite last page.

Liquid meter delivers preset amount automatically each time valve is opened. Batch ticket is also printed if desired by meter which is covered in Meter Data Bul 566 Y P—Liquid Meter Division, Neptune Meter Company.

Check 4817 opposite last page.

Servo-operated recorders of both electronic (98335) and pneumatic (98286) types have threshold sensitivity of 0.1% to input signal. They are expanded upon in Buls 98335 & 98286—Taylor Instrument Companies.

Check 4818 opposite last page.

Teflon tube, for laboratory and instrumentation use, has service-temperature range of −320 to +500° F, zero moisture absorption, and is available in sizes of 0.012 to 0.330" ID. Tube is explained in Teflon Tube Bul—Pennsylvania Fluorocarbon Co., Inc.

Check 4819 opposite last page.

Liquid-level gages can be operated at temperatures of sub-zero to 750°F. They are detailed in Cat 36 — Penberthy Manufacturing Company, Division of Buffalo-Eclipse Corporation.

Check 4820 opposite last page.



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1075 Perkins Avenue
Waukesha, Wisconsin

Check 4821 opposite last page.

CURRENT LITERATURE

Absolute pressure d/p cell transmitter has 3-15 psi signal output. It is topic of Bul 458-22A—The Foxboro Company.

Check 4822 opposite last page.

Gages for incorpate Bourdon tubes available in four materials—bronze, steel, stainless steel and K Monel. Gages are considered in Cat DH-65—Helicoid Gage Division, American Chain & Cable Company, Inc.

Check 4823 opposite last page.

Rotameters for handling corrosive fluids are reviewed in Bul 150—Brooks Rotameter Company.

Check 4824 opposite last page.

Electro-pneumatic transducer is available with or without pneumatic valve positioner. Input signals may be in ranges of 1 to 5 ma through 10 to 50 ma; output from 3 to 15 psi through 6 to 30 psi. It is detailed in Transducer 543 Bul—Continental Equipment Co. Division, Fisher Governor Company.

Check 4825 opposite last page.

Packaged system for investigation of controlled continuous polymerization is analyzed in Votator Systems Bul—Girdler Process Equipment Division, Chemetron Corporation.

Check 4826 opposite last page.

Thermocouples, incorporating ceramic-insulated metal-sheathed wire, are explained in Cat 34-R—Thermo Electric Co., Inc.

Check 4827 opposite last page.

Liquid-level controls have no moving parts in liquid. Standard two- and three-pull units are presented in 32-page Liquid-level Controls Cat—Charles F. Warrick Co.

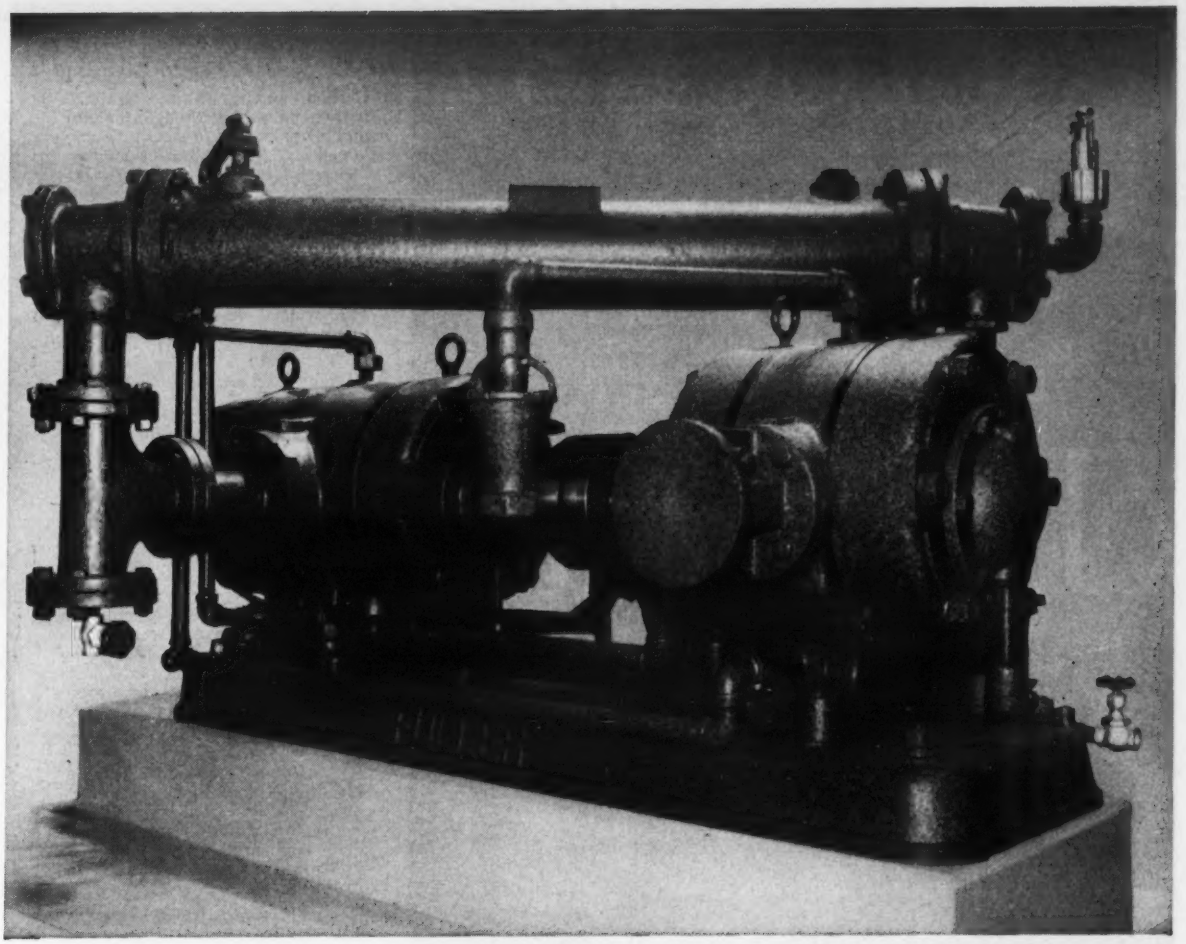
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Check 4829 opposite last page.

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Check 4830 opposite last page.

CURRENT LITERATURE

Carbon content can be determined in two minutes with determinator unit. Explanation of device is contained in 15-page Carbon-Sulphur Determinator Cat—Harry W. Dietert Co.

Check 4831 opposite last page.

Chemical pumps do not incorporate seals and stuffing boxes. They are specified in Bul 1100—Chempump Division, Fostoria Corporation.

Check 4832 opposite last page.

Automatic flow-accounting of all process and plant-service fluids is expedited by use of pneumatic integrator. Unit is illustrated and described in Bul 13-23—The Foxboro Company.

Check 4833 opposite last page.

Over 15,000 recording-chart types, in circular, strip and rectangular styles, are indexed in Recording Charts Stock List—Technical Sales Corporation, Subsidiary of Graphic Controls Corporation.

Check 4834 opposite last page.

Pressure-gage line includes models specifically designed for various degrees of toughness of application. They are expanded upon in Pressure Gages Cat—Marsh Instrument Company, Division of Colorado Oil & Gas Corporation.

Check 4835 opposite last page.

Two colorimetric analyzers come up for discussion in pair of bulletins. One (1156-1) discusses type for measuring concentrations in ppb ranges with accuracy range approaching ±3% of full-scale and sensitivity of ±1% of full-scale. Second model (858-1) is made for a simple analyses requiring single reagent. Buls 1156-1 and 858-1—Milton Roy Company.

Check 4836 opposite last page.

Plant Engineering and Maintenance

Wire-cloth line incorporating over 53,000 different specifications is covered by Wire Cloth Bul—The W. S. Tyler Company.

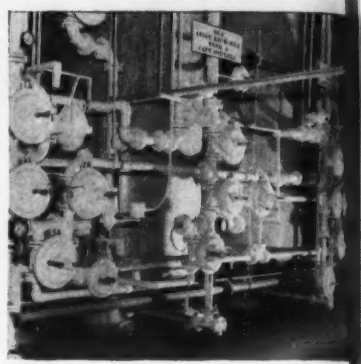
Check 4837 opposite last page.

Flexible connectors of metal are available in stock sizes of ¼ to 2" and lengths of 12 to 60". Information on line is incorporated in MNH Connectors Data Sheet—Allied Metal Hose Company.

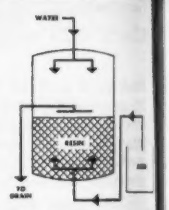
Check 4838 opposite last page.

HIRAM WALKER uses...

ILLCO-WAY ionXchange



Right, a diagram of the IWT Counterflow* system of regeneration, whereby a downward flow produces a "barrier" to keep the bed from being expanded by the upward flow of regenerant.



DISSOLVED SOLIDS IN RAW WATER REDUCED FROM 570 TO 3 PPM USING "COUNTERFLOW"

At the Hiram Walker distillery in Peoria, Illinois, the IWT equipment shown above is used to provide purified water for adjusting proof of various alcoholic beverages. It consists of *automatic* Counterflow* cation exchangers, automatic weakly-basic anion exchangers, and a vacuum degasifier. The de-ionized water is suitable for beverage use *without any need for activated carbon filtration*, because the resins used do not add any taste, color, or odor to the water. The equipment, after 2½ years, is still giving rated capacity of 140,000 gallons in each 24 hours. Quality, proposed at 5 ppm, actually runs mostly at 1 ppm with a maximum of 3 ppm. Counterflow* regeneration provides lowest operating cost through reduced regenerant dosages.

* U.S. Pat. 2,891,007

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Check 4839 opposite last page.

CURRENT LITERATURE

Worm-gear reducers are fan-cooled. They are available in 12 sizes in center distances of 1-⅛ to 8" and output torques to 46,000 lb-in. Line is presented in Radicon Reducers Bul—Foote Bros. Gear and Machine Corporation.

Check 4840 opposite last page.

Inert-gas generators have standard outputs of 2000 to 60,000 scfh. Submerged exhaust of combustion products is utilized. Generators are subject of Bul 114-B—Thermal Research & Engineering Corp.

Check 4841 opposite last page.

Lip seals control liquid injection in stuffing boxes and are explained in Bul 491-CP—Durametallic Corporation.

Check 4842 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

Wire-screen and wire-cloth products are detailed in Bul 160—The Cleveland Wire Cloth & Mfg. Co.

Check 4843 opposite last page.

Compressors designed for 720 rpm are pictured in detail in 16-page Bul 94—The Cooper-Bessemer Corporation.

Check 4844 opposite last page.

Turbines feature totally enclosed governors, totally enclosed and independently operated safety trips, multiple-steam-nozzle control and wide-bucket L-type wheel (optional). Complete details are included in Cat 200—Coppus Engineering Corporation.

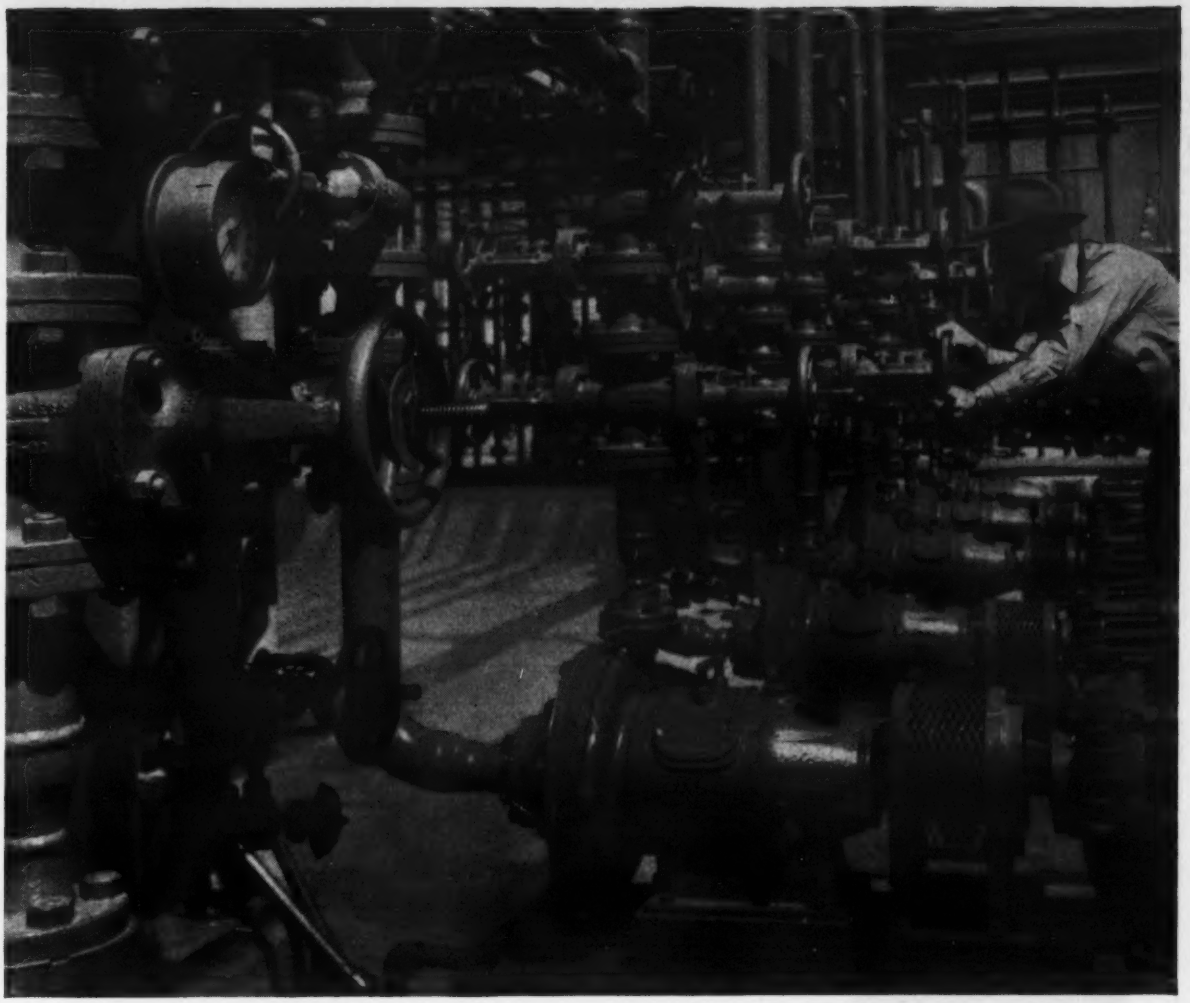
Check 4845 opposite last page.

PVC wet-weather gear has seams which are stitched with synthetic thread, then shielded and electronically welded. Buttons are also electronically welded in place. Clothing is pictured in North PVC Clothing Bul—Jomac Inc.

Check 4846 opposite last page.

Wire cloth and screen can be woven to order, in addition to being obtained from hundreds of weaves, meshes and metals in stock. Cat 105 outlines the types—Ludlow-Saylor Wire Cloth Company.

Check 4847 opposite last page.



Ni-Resist irons: best "life insurance" yet for pump parts that live with H_2SO_4

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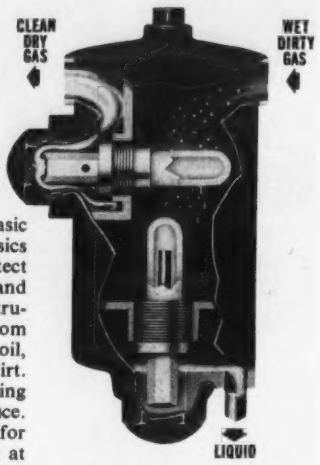
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Vanton PUMP & EQUIPMENT CORP.
DIVISION OF COOPER ALLOY CORP., HILLSIDE, N. J.

Check 4851 opposite last page.

CURRENT LITERATURE

Hydraulic oil filter precludes frequent draining or refilling of systems. Unit is specified in Hydraulic Oil Filter Bul—The Hilliard Corporation.

Check 4852 opposite last page.

Wire cloth, for filtering, sizing, straining and testing, is specified in Bul FC—Newark Wire Cloth Company.

Check 4853 opposite last page.

Instant-setting floor patch can be walked- and trucked-over immediately after application. It is subject of Instant-Use Brochure—Flexrock Company.

Check 4854 opposite last page.

Oil reclaimer removes solids, acids, volatile impurities, moisture, solvents, gases, etc. by heat-vacuum process. Unit is detailed in Oil Reclaimer Bul—The Hilliard Corporation.

Check 4855 opposite last page.

Packaging

Seamless cylinders for shipment of gases are available in complete range of sizes and shapes. Further details are included in Cylinders Bul—Pressed Steel Tank Company.

Check 4856 opposite last page.

Automatic bag packer is completely mechanical. It is detailed in Rotomatic Bag Packer Bul—Raymond Bag Corporation, Division of Albemarle Paper Mfg. Co.

Check 4857 opposite last page.

Bag packer fills and weighs, utilizing compressed-air method and incorporating no moving parts. Packer is specified in Airpac Bag Packers Bul—E. D. Coddington Mfg. Co.

Check 4858 opposite last page.

One-way polystyrene case is being used to hold four five-pint acid bottles. It is explained in One-Way Case Bul—General Chemical Division, Allied Chemical Corporation.

Check 4859 opposite last page.

Carboy for 13-gal acid bottles incorporates foamed-in-place expanded-polystyrene overpack which resists shock and cushions bottle in shipping and handling. It is detailed in Acid Carboy Bul—General Chemical Division, Allied Chemical Corporation.

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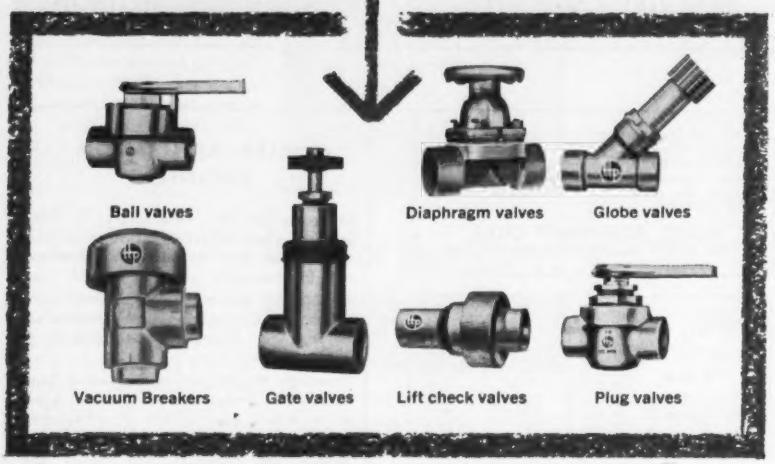
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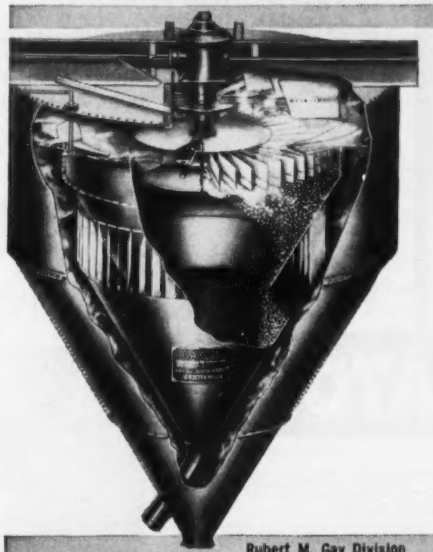
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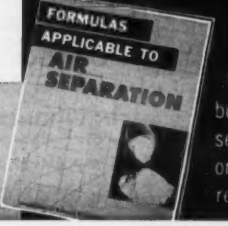
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THAT'S INTERESTING

Dolphin-modeled coating cuts underwater drag

Dolphins or porpoises provided the inspiration for a rubber coating which reduces underwater drag and may make possible submarine speeds as fast as 207 mps (180 knots).

Dr. Max O. Kramer, former German scientist and now vice president of Coleman-Kramer, Inc., Los Angeles, noticed that porpoises sped



Drag-reducing rubber coating features tiny pillars around which viscous fluid moves as coated vessel moves through water. Coating becomes flexible eliminating some of turbulence normally created by vessel

through water at speeds greater than could be expected for their bulk.

He theorized that this was due to the fact that turbulence did not form around porpoise's body. Eventually, he discovered that the porpoise is covered with 1/16" hydraulic skin — elastic and ducted — which minimizes drag by distributed damping.

This principle is being applied to rubber coating to be produced by United States Rubber Company's Mechanical Goods Division under name Lamiflo.

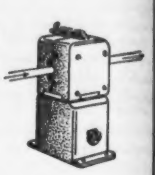
Fingerprints may replace signatures in commerce

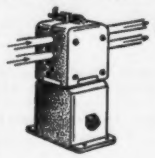
An inkless fingerprint system, under development by the Electronics Division of Chance Vought Aircraft, Incorporated, could herald the day when fingerprints will replace sig-

PUMPING IDEAS

POSSIBLE ONLY with a SIGMAMOTOR PUMP

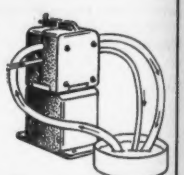
MOVE CORROSIVE LIQUIDS
Material being pumped never comes in contact with pump mechanism. Wave-like motion of steel fingers forces material through Tygon tubing. By changing size of tubing, capacity can be increased or decreased. Pump housing opens for removal and insertion of tubing.



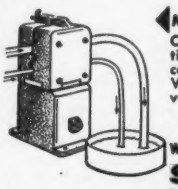


PUMP 2 OR 3 DIFFERENT LIQUIDS SIMULTANEOUSLY
Some models will accommodate up to four tubes so that four different liquids can be passed through the pump at one time without danger of contamination.

FEED AND MIX
One or more tubes can be feeding material to a mix while a larger tube is recirculating the liquid to produce agitation and thorough mixing. Viscous materials can be pumped without danger of gumming or plugging. Remove tube and pump is clean.



METER ADDITIVES
One or more additives can be pumped to a solution in the exact amount desired by selecting the correct size of tubing and regulating pump speed. Various controls can be incorporated to close valves ahead of pump.



Capacities from 0.5 cc. per min. to 4.5 G.P.M.

Write for complete information on sizes and capacities.

SIGMAMOTOR, INC.
18 N. Main Street • Middleport, N. Y

Check 4867 opposite last page.

modern WOOD TANKS WITH POLYMER LININGS



for Handling and Storage of Chemical Solutions

Non-Corrosive • Low Initial Cost • Low Maintenance Cost
High Insulation Value • Easy Erection

The introduction of NEW POLYMER LININGS for Wood Tanks has made possible the "POLYCEL" tank — for practically any chemical solution — covering a pH range from zero to fourteen. The combination of a low cost wood membrane and a variety of tough, resistant polymer films offers big advantages over high priced alloys.

Write today for up-to-the-minute information on "Polycel."

Also available, new factual tank industry bulletins on comparative costs, maintenance, chart of chemicals and effects, and thermal qualities. Ask for NWTI bulletins 1 through 5.

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If you want more information on processes, materials, controls, or other developments discussed herein, as you read this issue, ask our READER SERVICE DEPARTMENT . . . use this sheet

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☐ 4592*	☐ 4640	☐ 4688	☐ 4736	☐ 4784	☐ 4832
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☐ 4621*	☐ 4669	☐ 4717	☐ 4765	☐ 4813	☐ 4861
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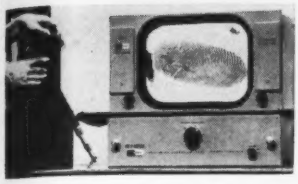
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natures on such things as checks, credit cards, coin-operated insurance machines and other commercial applications.

Developed by Wyman White, the system requires only that a person touch a small area of glass. From this the fingerprint pattern is projected on a screen or ground glass for inspection, comparison or photographing.

White is also working on a device which will permit rapid classification of fingerprints and a system for transmitting "live" prints by telephone or closed circuit television.



Huge air-supported dome towers nine stories

A dome-like structure, as high as a nine-story building and 150′ in diam, is world's largest air-supported structure. Now in use by the armed forces as missile maintenance shelter at Andrews Air Force Base near Washington, D.C., it is connected to four smaller domes, each 50-ft high.

Heavy equipment is moved in and out of structure through 100-ft-long "pressure locks." Each structure, made from combination fabric consisting of nylon coated with Geon vinyl, is supported by air at 1/10 psi, which is generated by low-pressure high-volume blowers. Fabric was developed by Sawyer Coated Fabrics Division of Farrington Texol Corporation, Watertown, Mass. Vinyl is product of B. F. Goodrich Chemical Company.



The new, Appleton "CES-CESD" type receptacle Unilet and matching plug is feature-packed to give you outstanding performance for all industrial equipment requiring heavy-duty circuit breaking outlets *without* disconnect switches ahead of the outlet.

You will particularly like the installation simplicity—the push-pull operating ease and these Appleton convenience features . . .

Advanced, compact design • Interchangeability of plug or receptacle with certain other brands • pressure-type solderless receptacle connectors • exclusive plug-locking slide mechanism • smooth surfaces, chamfered edges • concealed cable clamp • choice of 30-ampere, ¾" hub or 60-ampere, 1¼" hub in CES or CESD types • and the quality construction that meets most installation requirements; CES for Class I, Groups C and D—CESD for Class I, Group D.

Wherever hazardous area installations *or replacements* are made, you can depend upon this latest Appleton development to give you safe, foolproof protection. Write today for full details—bulletin No. CES 660.

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Also manufacturers of:


"ST" Series Connectors


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Check 4869 opposite last page.



BONDSTRAND®

An imaginative solution to your piping problems

From Missile Research...

A new product for process piping

- Twice as strong as steel
- 1/4 the weight of steel
- Inherently resistant to chemicals which attack stainless steel

Bondstrand is a corrosion-resistant, high strength, rigid pipe made of glass filaments bonded in chemically inert synthetic resins. It is capable of withstanding high pressure and the corrosive attack of many salt, acid, and alkaline solutions. The outside surface is equally resistant because the pipe is made entirely of corrosion-proof materials. No painting or maintenance is necessary.

Bondstrand's light weight and ease of assembly can save up to 50% of installation costs. Actual cost records of typical applications prove that the total installed cost averaged only 1.3 times that of carbon steel pipe. By eliminating the corrosion problem and down time for replacement or repair, Bondstrand saves many times its slightly higher initial cost.

Bondstrand is now available in sizes from 2″ through 8″ with all necessary couplings and fittings. Larger sizes available on special order.

Write for bulletin containing complete data, including physical properties, chemical resistance, flow rates, and other design information.

Amercoat® CORPORATION 125

A Subsidiary of American Pipe and Construction Co.

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